### INDEPENDENT ORBITER ASSESSMENT

ANALYSIS OF THE
ELECTRICAL POWER
DISTRIBUTION AND CONTROL/
ELECTRICAL POWER
GENERATION SUBSYSTEM

**19 DECEMBER 1986** 

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### MCDONNELL DOUGLAS ASTRONAUTICS COMPANY HOUSTON DIVISION

### SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA86001-19

INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE EPD&C/EPG SUBSYSTEM

### 19 DECEMBER 1986

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### CONTENTS

			Page			
1.0	EXE	CUTIVE SUMMARY	1			
2.0	INTRODUCTION					
	2.2	Purpose Scope Analysis Approach EPD&C/EPG Ground Rules and Assumptions	4 4 4 5			
3.0	SUBS	SYSTEM DESCRIPTION	6			
	3.2	Design and Function Interfaces <u>and</u> Locations Hierarchy	6 7 7			
4.0	ANAI	LYSIS RESULTS	13			
	4.2 4.3 4.4	Analysis Results - Power Section Assembly Analysis Results - Reactant Control Subsystem Analysis Results - Thermal Control System Analysis Results - Water Removal System Analysis Results - Power Reactant Storage Distribution System	14 14 14 14			
5.0	REFI	ERENCES	15			
APPE	NDIX	A ACRONYMS	<b>A</b> -1			
APPE	NDIX	B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS	B-1			
	B.2	Definitions Project Level Ground Rules and Assumptions Subsystem Specific Ground Rules and Assumptions	B-2 B-4 B-6			
APPE	NDIX	C DETAILED ANALYSIS	C-1			
APPE	NDIX	D POTENTIAL CRITICAL ITEMS	D-1			

			List of Figures	
			J	Page
Figure	1	_	EPD&C/EPG OVERVIEW ANALYSIS SUMMARY	2
Figure	2	_	EPD&C/EPG SUBSYSTEM OVERVIEW	8 9
Figure	3	_	EPG SUBSYSTEM OVERVIEW	9
Figure	4	_	PRSDS SUBSYSTEM OVERVIEW	10
Figure			EPD&C/EPG HARDWARE LOCATION IN	
_			THE ORBITER VEHICLE	11
Figure	6	_	EPD&C/EPG INTERFACES	12
		-		
			List of Tables	
				Page
Table	I	_	SUMMARY OF IOA FAILURE MODES AND	
			CRITICALITIES	13
mahla	**		CINMARY OF TOX DOMERNITAT COTUTOAT TURNS	12

### Independent Orbiter Assessment Analysis of the EPD&C/EPG Subsystem

### 1.0 EXECUTIVE SUMMARY

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The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results corresponding to the Orbiter Electrical Power Distribution and Control (EPD&C)/Electrical Power Generation (EPG) hardware.

The EPD&C/EPG hardware is required for performing critical functions of cryogenic reactant storage, electrical power generation and product water distribution in the Orbiter. Specifically, the EPD&C/EPG hardware consists of the following components:

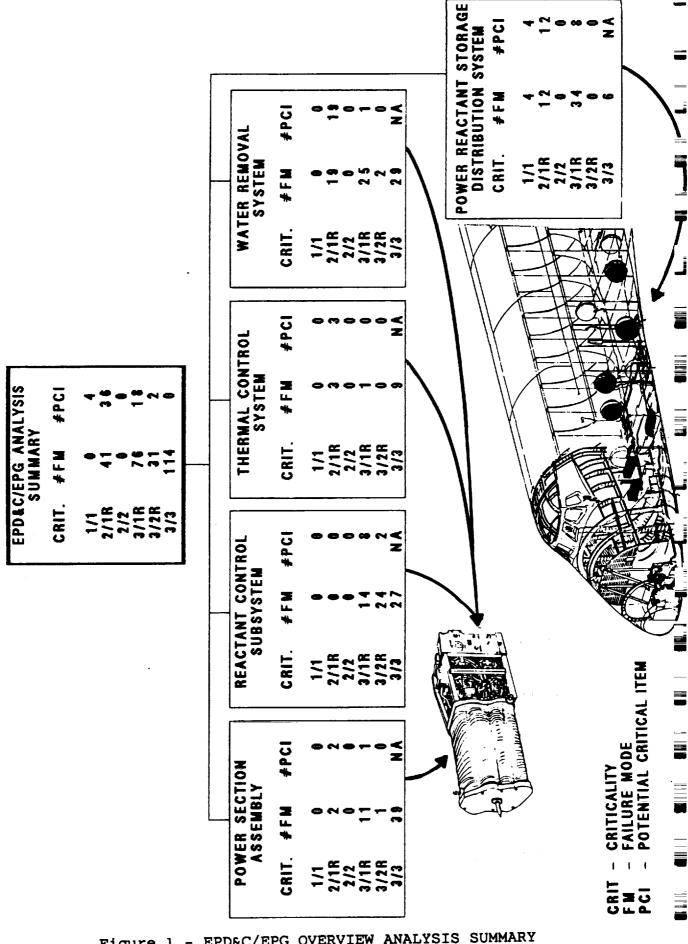
- o Power Section Assembly (PSA)
- o Reactant Control Subsystem (RCS)
- o Thermal Control Subystem (TCS)
- o Water Removal Subsystem (WRS)
- o Power Reactant Storage and Distribution System (PRSDS)

The IOA analysis process utilized available EPD&C/EPG hardware drawings and schematics for defining hardware assemblies, components, and hardware items. Each level of hardware was evaluated and analyzed for possible failure modes and effects. Criticality was assigned based upon the severity of the effect for each failure mode.

Figure 1 presents a summary of the failure criticalities for each of the five major subdivisions of the EPD&C/EPG. A summary of the number of failure modes, by criticality, is also presented below with Hardware (HW) criticality first and Functional (F) criticality second.

Summary	of	IOA E	failure	Modes	By Cri	ticali	ty (HW	V/F)
Criticality	:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number	:	4	36	-	85	27	110	262

## EPD&C/EPG OVERVIEW ANALYSIS SUMMARY



EPD&C/EPG OVERVIEW ANALYSIS SUMMARY

For each failure mode identified, the criticality and redundancy screens were examined to identify critical items. A summary of Potential Critical Items (PCIs) is presented as follows:

Summary of	IOA Pot	ential	Critic	cal Ite	ems (F	W/F)
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
Number :	4	36	-	18	2	60

### 2.0 INTRODUCTION

### 2.1 Purpose

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assesment of the Orbiter FMEA/CIL reevaluation results for completeness and technical accuracy.

### 2.2 Scope

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, functions, internal and external interfaces, and operational requirements for all mission phases.

### 2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing as-built drawings to breakdown the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEAs/CILs that is performed and documented at a later date.

- Step 1.0 Subsystem Familiarization

  - 1.1 Define subsystem functions1.2 Define subsystem components
  - 1.3 Define subsystem specific ground rules and assumptions
- Step 2.0 Define subsystem analysis diagram
  - 2.1 Define subsystem
  - 2.2 Define major assemblies
  - 2.3 Develop detailed subsystem representations
- Step 3.0 Failure events definition
  - 3.1 Construct matrix of failure modes
  - 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL

- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues4.4 Forward findings to Project Manager

### EPD&C/EPG Ground Rules and Assumptions

The EPD&C/EPG ground rules and assumptions used in the IOA are defined in Appendix B.

### 3.0 SUBSYSTEM DESCRIPTION

### 3.1 Design and Function

The EPD&C/EPG consists of hardware that is required for the command and control of electrical power generation, FC operation, and cryogenic reactant distribution and control in the Orbiter. The EPD&C/EPG consists of the following divisions:

- 1. The Power Section Assembly (PSA) utilizes the cryogenic reactants to produce the necessary electrical power for the Orbiter. By-products of this reaction include excess water and heat. The PSA is composed of cell plates, pressure plates, heater/insulator plates, and cell voltage harnesses. Each stack contains ninety-six cell plates grouped into three substacks connected in series. Analog data outputs from each cell are transmitted to the Orbiter via a cell performance monitor.
- 2. The Reactant Control Subsystem (RCS) heats the cryogenic reactants from the PRSDS to an acceptable temperature for use in the PSA. The RCS delivers reactants and controls the pressure within the cell plates. Purging of the inert gases from the reactant lines is provided along with the circulation of hydrogen for excess water removal from the PSA. The RCS is composed of preheaters, reactant regulator, hydrogen pump-separator, condenser, and reactant purge/vent lines.
- The Thermal Control System (TCS) controls operating temperatures and electrolyte concentration in the PSA. Waste heat is used to condense water vapor. Heat is also transferred to the preheaters for the reactant gases and rejected via the Orbiter vehicle cooling system.
- 4. The Water Removal Subsystem (WRS) removes product water from the PSA during normal operation. The excess water is produced from water vapor which is converted to a liquid by the condenser. The WRS delivers the water to the Orbiter vehicle potable water storage system or to the water relief line. The WRS consists of the condenser, hydrogen pump-separator, water trap, water discharge line, and water purity sensor.
- 5. The Power Reactant Storage and Distribution System (PRSDS) stores the cryogenic reactants (hydrogen and oxygen) for use in the production of electrical power in the fuel cells. The PRSDS can be configured to include up to five tanks of each of the reactant gases.

Each tank contains redundant heating elements and sensors to maintain the gases at the proper pressure. The PRSDS also provides gases to the Environmental Control and Life Support System (ECLSS).

### 3.2 Interfaces and Locations

The elements of the EPD&C/EPG are installed in the mid-body of the Orbiter vehicle beneath the payload bay liner. Each of the three fuel cells are located in the forward part of the bay, with FCP 1 on the left-hand side, with FCP 2 and FCP 3 located forward and aft, respectively on the right-hand side. Each of the PRSDS cryogenic reactant storage tanks are located along the outer edges of the payload bay under the liner. Cryogenic reactants (oxygen and hydrogen) are transferred on demand to the FCP and oxygen is transported directly to the ECLSS. Crew command and control is achieved via switches, circuit breakers, or meters located in the Orbiter cabin. Product water from the PSA is transported to the ECLSS for storage and waste heat is rejected to the cooling system. Three-phase AC electrical power is received from the Orbiter by the FCP to power the coolant pump, hydrogen pump-separator, and the water purity sensor. DC power generated by the FCP is distributed by the EPD&C. Reference Figure 5.

### 3.3 Hierarchy

Figure 2 illustrates the hierarchy of the EPD&C/EPG hardware and the corresponding subcomponents. Figures 3 through 6 comprise the detailed system representation.

# ELECTRICAL POWER DISTRIBUTION AND CONTROL/ELECTRICAL POWER GENERATION SUBSYSTEM OVERVIEW

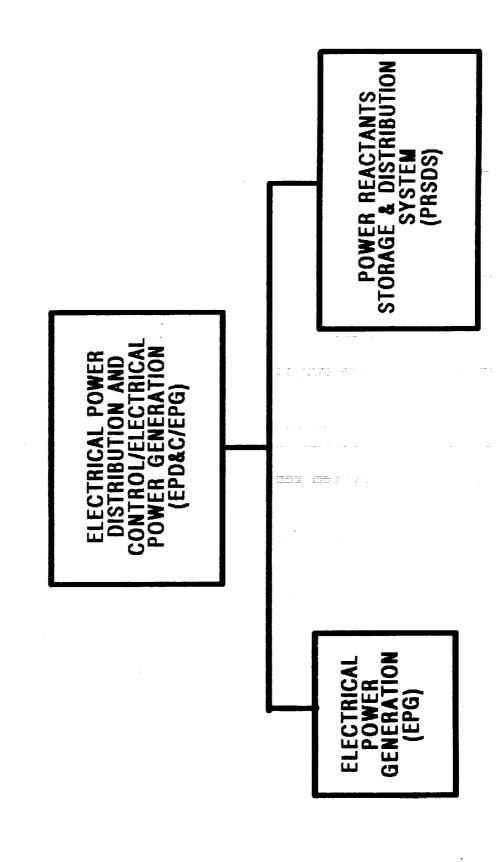


Figure 2 - EPD&C/EPG SUBSYSTEM OVERVIEW

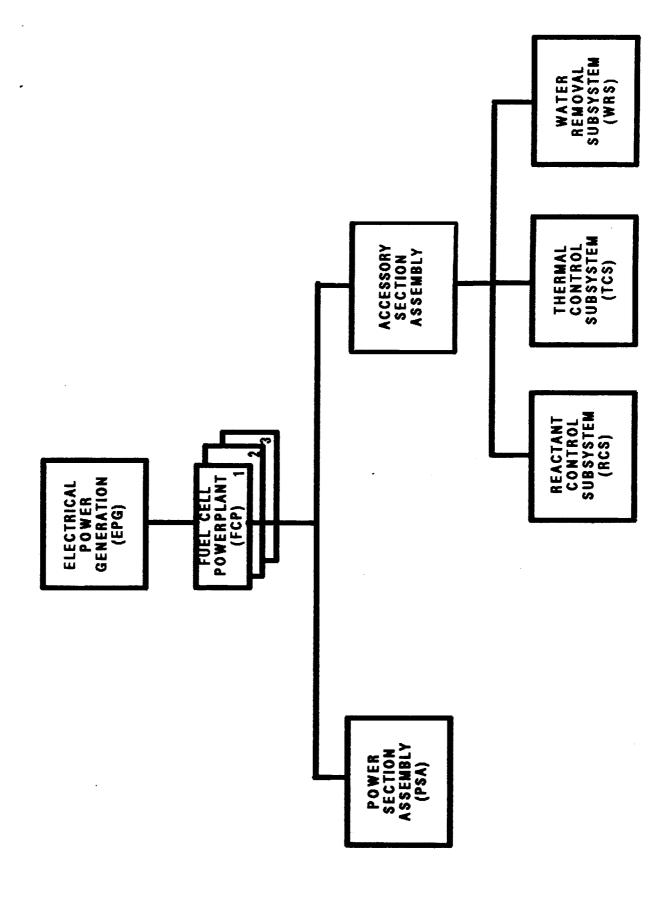


Figure 3 - EPG SUBSYSTEM OVERVIEW

Figure 4 - PRSDS SUBSYSTEM OVERVIEW

## EPD&C/EPG HARDWARE LOCATION IN THE ORBITER VEHICLE

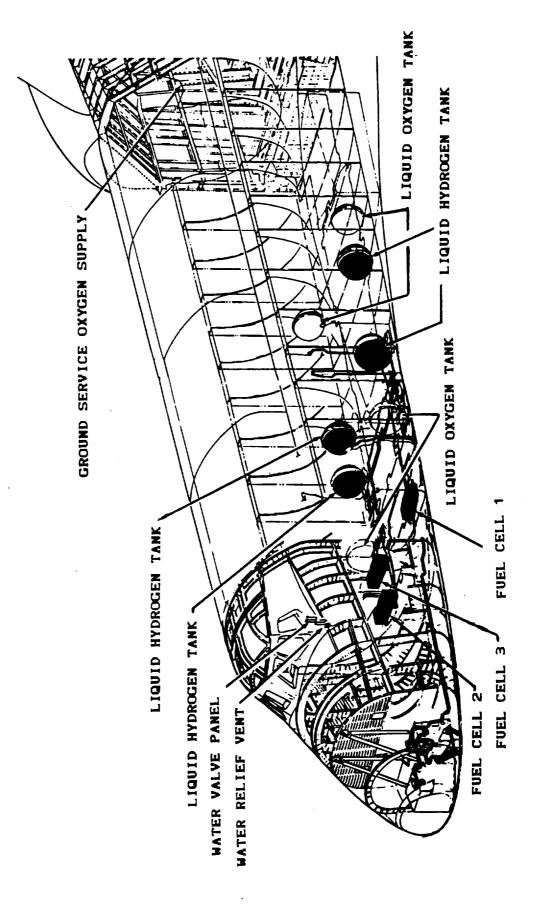


Figure 5 - EPD&C/EPG HARDWARE LOCATION IN THE ORBITER VEHICLE

### EPD&C/EPG INTERFACES

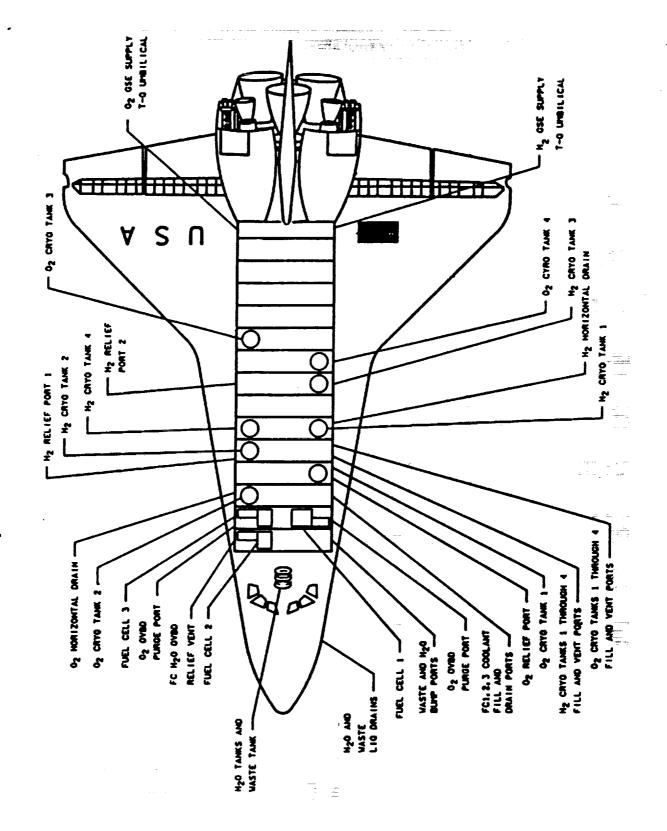


Figure 6 - EPD&C/EPG INTERFACES

### 4.0 ANALYSIS RESULTS

Detailed analysis results for each of the identified failure modes are presented in Appendix C. Table I presents a summary of the failure criticalities for each of the two major subdivisions of the EPD&C/EPG. Further discussion of each of these subdivisions and the applicable failure modes is provided in subsequent paragraphs.

TABLE I Summary of IOA Failure Modes and Criticalities								
Critical	ity:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
PSA	:	-	2	-	11	1	39	53
RCS	:	-	_	_	14	24	27	65
TCS	:	-	3	_	1	-	9	13
WRS	:	-	19	_	25	2	29	75
PRSDS	:	4	12	_	34	<u>-</u>	6	56
TOTAL		4	36	_	85	27	110	262

Of the 262 failure modes analyzed, no single failures were determined to result in loss of crew or vehicle, and 60 were determined to result in loss of mission. A summary of the potential critical items is presented in Table II. Appendix D presents a cross reference between each potential critical item (PCI) and a specific worksheet in Appendix C.

1	TABLE II Summary of IOA Potential Critical Items						
	Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
	EPD&C/EPG :	4	36	-	18	2	60

### 4.1 Analysis Results - Power Section Assembly

The Power Section Assembly produces the electrical power necessary for the Orbiter vehicle operation. There are fifty-three failure modes identified for this division. Of these, two are criticality 2/1R, eleven are criticality 3/1R, one is criticality 3/2R, and thirty-nine are criticality 3/3. Three failures from the PSA are identified to be PCI's. These are listed in Appendix D.

### 4.2 Analysis Results - Reactant Control Subsystem

The Reactant Control Subsystem (RCS) provides the cryogenic reactants to the PSA at an acceptable pressure and temperature. There are sixty-five failure modes identified for this division. Of these, fourteen are criticality 3/1R, twenty-four are criticality 3/2R, and twenty-seven are criticality 3/3. Ten failures from the RCS are identified to be PCI's. These are listed in Appendix D.

### 4.3 Analysis Results - Thermal Control System

The Thermal Control System (TCS) controls operating temperatures and electrolyte concentration in the PSA. There are thirteen failure modes identified for this division. Of these, three are criticality 2/1R, one is criticality 3/1R, and nine are criticality 3/3. Three failures from the TCS are identified to be PCI`s. These are listed in Appendix D.

### 4.4 Analysis Results - Water Removal Subsystem

The Water Removal Subsystem (WRS) removes product water from the FCP during normal operation. There are seventy-five failure modes identified for this division. Of these, nineteen are criticality 2/1R, twenty-five are criticality 3/1R, two are criticality 3/2R, and twenty-nine are criticality 3/3. Twenty failures from WRS are identified to be PCI's. These are listed in Appendix D.

### 4.5 Analysis Results - Power Reactant Storage and Distribution System

The Power Reactant Storage and Distribution System (PRSDS) stores the cryogenic reactants for use in the FCP to produce electrical power. There are fifty-six failure modes identified for this division. Of these, four are criticality 1/1, twelve are criticality 2/1R, thirty-four are criticality 3/1R, and six are criticality 3/3. Twenty-four failures from PRSDS are identified to be PCI's. These are listed in Appendix D.

### 5.0 REFERENCES

Reference documentation available from NASA and Rockwell was used in the analysis. The documentation used included the following:

- 1. JSC-12820, PCN-1, STS Operational Flight Rules, 12-16-85
- 2. V45 File III, Operations and Maintenance Requirements and Specifications Document- Orbiter OMRSD- Electrical Power Generation/Power Reactant Storage and Distribution, 5-29-86
- 3. NSTS 22206, Instructions for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL), 10-10-86
- 4. 100-2G, Rockwell International Reliability Desk Instruction Flight Hardware FMEA and CIL, 1-31-84
- 5. Orbiter Fuel Cell Powerplant Review and Training Course, International Fuel Cells (IFC), 5-86
- 6. JSC-11174, Space Systems Handbook, Rev. C, DCN-5, 9-13-95
- 7. VS70-976102, Integrated System Schematic Orbiter Vehicle OV-102 EPDC, Rev. F, 7-2-86
- 8. VS70-945099, Integrated System Schematic Orbiter Vehicle OV-099, 103, & 104, Electrical Power Subsystem (EPS), 7-18-85
- VS70-945102, Integrated System Schematic Orbiter Vehicle OV-102, Electrical Power Subsystem (EPS), 9-19-84
- 10. Rockwell International Drawings

a. VS70-450212	CRYO Subsystem	OV-102, Flt 7 and subs
b. VS70-450209	CRYO Subsystem	OV-099, Flt 1-3 only
c. VS70-450202	CRYO Subsystem	OV-102, Flt 1-4 only
d. VS70-450222	CRYO Subsystem	OV-102, Flt 6
e. VS70-450219	CRYO Subsystem	OV-99, 103 Flt 4 and subs

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### APPENDIX A ACRONYMS

AOA - Abort Once Around ATO - Abort To Orbit - Critical Items List CIL Criticality CRIT - Caution and Warning System C&W ECLSS - Environmental Control and Life Support System EPD&C - Electrical Power Distribution and Control - Electrical Power Generation EPG FCP - Fuel Cell Powerplant - Fuel Cell FC - Failure Modes and Effects Analysis **FMEA** - Flight System Software Requirement FSSR - Get Away Special GAS GPC General Purpose Computer - Ground Support Equipment GSE - Hybrid Driver Controller HDC IQA - Independent Orbiter Assessment - McDonnell Douglas Astronautics Company MDAC MDM - Multiplexer/Demultiplexer - National Aeronautics and Space Administration NASA - Not Applicable NA National Space Transportation System NSTS Operational Forward OF OMRSD - Operational Maintenance Requirements and Specifications Document PCA - Power Control Assembly PCI - Potential Critical Item PLS - Primary Landing Site - Power Section Assembly PSA - Program Requirements Control Board PRCB PRSDS - Power Reactant Storage and Distribution System Rockwell International RCS - Reactant Control Subsystem - Remote Power Controller RPC RTLS - Return To Landing Site STS - Space Transportation System TAL - Transatlantic Abort Landing - Thermal Control Subsystem TCS - Water Removal Subsystem WRS

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### APPENDIX B

### DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

- B.1 Definitions
  B.2 Project Level Ground Rules and Assumptions
  B.3 Subsystem-Specific Ground Rules and Assumptions

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### APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

### B.1 Definitions

Definitions contained in NSTS  $\underline{22206}$ , Instructions For Preparation of FMEA/CIL, 10 October  $\underline{1986}$ , were used with the following amplifications and additions.

### INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

CREDIBLE (CAUSE) - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

CONTINGENCY CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

EARLY MISSION TERMINATION - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the highest criticality

HIGHEST CRITICALITY - the highest functional criticality determined in the phase-by-phase analysis

 $\frac{\text{MAJOR}}{\text{(OPS)}}$   $\frac{\text{MODE}}{\text{(OPS)}}$  - major sub-mode of software operational sequence

 $\underline{\mathsf{MC}}$  - Memory Configuration of Primary Avionics Software System (PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

OFF-NOMINAL CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

2 3 2 3 3 3 3 3 3

PRIMARY MISSION OBJECTIVES - worst case primary mission objectives are equal to mission objectives

### PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter
power-up and ends at moding to OPS Major Mode 102 (liftoff)

LIFTOFF MISSION PHASE - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

DEORBIT PHASE - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

<u>LANDING/SAFING PHASE</u> - begins at first main gear touchdown and ends with the completion of post-landing safing operations

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### APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206, Instructions for Preparation of FMEA/CIL, 10 October 1986, was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

### APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

- B.3 EPD&C/EPG-Specific Ground Rules and Assumptions
  - 1. Component age life will not be considered in the analysis.

RATIONALE: Component age analysis is beyond the scope of this task.

2. An O2 cryo tank will be assumed lost if both heaters in one tank fail to function (i.e., neither heater will function with the delta current sensors enabled).

RATIONALE: Systems failure definition. Flight rule definition.

3. An H2 cryo tank will be assumed lost if neither heater in one tank will function.

RATIONALE: Systems failure definition. Flight rule definition.

4. An impending loss of all cryo O2 or all cryo H2 tanks will be cause to exercise the highest-priority abort mode the loss/leak will allow.

RATIONALE: Flight rule definition.

5. Continue nominal ascent if 2/3/4 O2 (H2) tanks fail when flying 3/4/5.

Enter next PLS daily go/no-go if two O2 (H2) tanks fail during lift-off and on-orbit.

RATIONALE: Flight rules go/no-go criteria.

- 6. A fuel cell will be considered failed if the following conditions exist.
  - a. Coolant pump or H2 pump/H2O separator is lost.
  - b. Coolant pressure >75 (71.4) PSIA and increasing.
  - c. Fuel cell unable to discharge water to the ECLSS H2O storage tanks or overboard via the fuel cell H2O relief system.
  - d. Fuel cell reactant valve fails closed.
  - e. Cannot be connected to a main bus.

- f. Fuel cell 02 reaction chambers cannot be purged.
- g. Fuel cell end-cell heater failing on.
- 10. Loss of two fuel cells in the first stage of ascent is considered loss of life/vehicle.

RATIONALE: SRB loads are too high for one fuel cell to support. Voltage may go <25V which will shut down the GPC's.

11. Although the ECLSS product-water storage is a separate system from EPD&C/EPG, it will be considered as a failable redundant product-water relief line for purposes of the EPG functional criticality scenarios.

RATIONALE: This assumption violates general ground rule 2.3.2.d in NSTS 22206 but is essential for evaluating failures associated with the water relief line.

12. The start/sustaining heater on the left-hand FCP (FCP #1) is assumed to be disconnected. Thus, this FCP cannot be maintained operational at no-load, and will be considered shutdown if the load cannot be maintained at greater than 2 KW.

RATIONALE: Load needed to maintain operating temperature. RH FCP uses sustain heater to maintain temps at no-load.

13. For all "failed open" failure modes for valves which are normally open, redundancy screen B will be assumed failed.

RATIONALE: The failure is not detectable until the valve is required to be closed.

14. Five O2 and H2 tanks are being used as the baseline configuration under study.

RATIONALE: The configuration for all redundant components is being considered for this analysis.

15. Inadvertant Fuel Cell shutdown during RTLS and TAL abort is considered loss of crew/vehicle.

RATIONALE: Loss of FCP 1/Main Bus A is loss of OMS Engine Purge Capability (required for TAL) and Aft Compartment MPS Helium Purge capability (required for RTLS and TAL).

### APPENDIX C DETAILED ANALYSIS

This section contains the IOA analysis worksheets generated during the analysis of this subsystem. The information on these worksheets is intentionally similar to the NASA FMEAs. Each of these sheets identifies the hardware item being analyzed, and parent assembly, as well as the function. For each failure mode, the possible causes are outlined, and the assessed hardware and functional criticality for each mission phase is listed, as described in the NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Finally, effects are entered at the bottom of each sheet, and the worst case criticality is entered at the top.

### LEGEND FOR IOA ANALYSIS WORKSHEETS

### Hardware Criticalities:

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item
   (like or unlike) could cause loss of life/vehicle
- 3 = All others

### Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission.

### Redundancy Screen A:

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- NA = Not Applicable

### Redundancy Screens B and C:

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

### INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE:

FLIGHT: 3/1R SUBSYSTEM: EPD&C 3/1R ABORT: MDAC ID: 2000

SWITCH, FUEL CELL 1,2,3 START/STOP CONTROL ITEM:

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- EPG
- 2) FUEL CELL
- 3) PNL R1A2
- 4) SWITCH S16, S17, S18
- 5)
- 6)
- 7)
- PSA 8)
- 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2S16, 32V73A1A2S17, 32V73A1A2S18

PART NUMBER: ME452-0102-7355

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:

LOSS OF ABILITY TO START A FUEL CELL. MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF MISSION/VEHICLE.

REFERENCES:

### INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/2R

MDAC ID: 2001

ABORT:

3/2R

ITEM:

SWITCH, FUEL CELL 1,2,3 START/STOP CONTROL

FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PNL R1A2 3)
- 4) SWITCH S16, S17, S18

6)

7)

8) PSA

05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/3	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2S16, 32V73A1A2S17, 32V73A1A2S18

PART NUMBER: ME452-0102-7355

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:

INABILITY TO SHUT DOWN ACTIVE FUEL CELL. ALTERNATE METHODS OF FCP SHUTDOWN AVAILABLE.

REFERENCES:

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: 2002 MDAC ID: RESISTORS, 5.1K, 1/4W ITEM: FAILURE MODE: ALL CREDIBLE MODES SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) 3) PNL R1A2 RESISTORS A2R6, A2R7, A2R14, A2R3 4) 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC FLIGHT PHASE HDW/FUNC ABORT 3/3 RTLS: PRELAUNCH: 3/3

TAL: LIFTOFF: 3/3 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ ] B [ ] C [

LOCATION:

32V73A1A2A2R6,R7,A2R14, R3

PART NUMBER: RLR07C512GR

CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL CAUSES:

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2003

ABORT:

3/1R

ITEM:

RESISTORS, 1.2K

FAILURE MODE: ELEMENTS OPENS, H-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PNL R1A2 3)
- RESISTORS A1R35, A1R22, A2R13

6)

7)

8) PSA

05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
ONORBIT:	3/1R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
TANDING /SARING	2/2		•	

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2A1R35, 22, A2R13

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO START FCP OR RESTART A SHUTDOWN FCP, OR TO STOP AN ACTIVE FCP. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FCP.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2004 RESISTORS, 1.2K ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R1A2 RESISTORS A1R35, A1R22, A2R13 4) 5) 6) 7) 8) PSA 05-6MA 9)

CRITICA	CRITICALITIES			
HDW/FUNC	ABORT	HDW/FUNC		
3/3	RTLS:	3/3		
3/3	TAL:	3/3		
3/3	AOA:	3/3		
3/3	ATO:	3/3		
3: 3/3	•	·		
	HDW/FUNC 3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

32V73A1A2A1R35, 22, A2R13

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2005

FLIGHT: 3/1R ABORT:

3/1R

ITEM:

RESISTORS, 1.2K

FAILURE MODE: ELEMENTS OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R1A2
- 4) RESISTORS A1R4, A1R13, A2R10

6)

- 7)
- 8) PSA 05-6MA 9)

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC			
PRELAUNCH:	3/3	RTLS:	3/1R			
LIFTOFF:	3/1R	TAL:	3/1R			
ONORBIT:	3/1R	AOA:	3/1R			
DEORBIT:	3/1R	ATO:	3/1R			
TANDING/SAFING.	3/3		•			

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2A1R4, R13, A2R10

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

### EFFECTS/RATIONALE:

LOSS OF ABILITY TO START/STOP FCP. REDUNDANT FCP SHUTDOWN PATHS AVAILABLE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF SUFFICIENT ELECTRICAL POWER.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2006 ABORT: 3/3

ITEM: RESISTORS, 1.2K

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R1A2
- 4) RESISTORS A1R4, A1R13, A2R10
- 5) 6)
- 7)
- 8) PSA
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3		•	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

32V73A1A2A1R4, R13, A2R10

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2007

FLIGHT: ABORT:

3/1R 3/1R

ITEM:

RESISTORS, 1.2K

FAILURE MODE: ELEMENTS OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL R1A2
- RESISTORS A2R8, A1R17, A2R11

5) 6)

7)

- PSA 8)
- 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC			
PRELAUNCH:	3/3	RTLS:	3/1R			
LIFTOFF:	3/1R	TAL:	3/1R			
ONORBIT:	3/1R	AOA:	3/1R			
DEORBIT:	3/1R	ATO:	3/1R			
TANDING/SAFINGS	3/3		•			

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A1A2A2R8, A1R17, A2R11

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

#### EFFECTS/RATIONALE:

LOSS OF ABILITY TO START/STOP FCP. REDUNDANT FCP SHUTDOWN PATHS AVAILABLE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF SUFFICIENT ELECTRICAL POWER.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: MDAC ID: 2008 ITEM: RESISTORS, 1.2K FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: EPG 1) 2) FUEL CELL 3) PNL R1A2 RESISTORS A2R8, A1R17, A2R11 4) 5) 6) 7) 8) PSA

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	CIVITION		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A1A2A2R8, A1R17, A2R11

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

9)

EFFECTS/RATIONALE:

05-6MA

NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2009

FLIGHT: ABORT:

2/1R 2/1R

ITEM:

SWITCH, FUEL CELL 1,2 & 3 CONTROLLER

FAILURE MODE: FAILS TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL 014, 015, 016
- SWITCH \$12, \$11, \$11 4)
- 5)
- 6)
- 7)
- PSA 8)
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
Landing/Safing:	2/1R		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A14S12, A15S11, A16S11

PART NUMBER: ME452-0102-7101

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

## EFFECTS/RATIONALE:

LOSS OF ASSOCIATED FUEL CELL; LOSS OF REDUNDANCY AT FCP LEVEL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LACK OF ADEQUATE POWER.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2010 SWITCH, FUEL CELL 1,2 & 3 CONTROLLER ITEM: FAILURE MODE: SHORTS, INADVERTANTLY CLOSES SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: EPG 2) FUEL CELL PNL 014, 015, 016 3) 4) SWITCH S12, S11, S11 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 3/3 PRELAUNCH: 3/3 TAL: LIFTOFF: 3/3 AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 3/3 DEORBIT: 3/3 LANDING/SAFING: C [ ] REDUNDANCY SCREENS: A [ ] B [ ] 32V73A14S12, A15S11, A16S11 LOCATION: PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2011

FLIGHT: 2/1R ABORT: 2/1R

ITEM:

RESISTORS 1.2K

FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL 014, 015, 016
- 4) RESISTOR A5R1, A5R1, A6R1
- 5) 6)
- 7)
- 8) PSA
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING	: 2/1R		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A14A5R1, A15A5R1, A16A6R1

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

LOSS OF ASSOCIATED FUEL CELL. LOSS OF REDUNDANCY AT FCP LEVEL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LACK OF ADEQUATE POWER.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 SUBSYSTEM: EPD&C FLIGHT: 3/3 3/3 ABORT: MDAC ID: 2012

ITEM: RESISTORS 1.2K

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL 014, 015, 016
- RESISTOR A5R1, A5R1, A6R1 4)
- 5) 6)
- 7)
- 8)
- PSA 05-6MA 9)

CRITICALITIES

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HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		·
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

C [ ] REDUNDANCY SCREENS: A [ ] B [ ]

LOCATION:

32V73A14A5R1, A15A5R1, A16A6R1

PART NUMBER: RWR80S1211FR

CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL CAUSES:

SHOCK

EFFECTS/RATIONALE:

NONE.

HDW/FUNC HIGHEST CRITICALITY 11/25/86 DATE: 3/3 SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/3 2013 MDAC ID: SWITCH, FUEL CELL NO 1 START UP HEATER ITEM: FAILURE MODE: ALL CREDIBLE FAILURES. LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PNL R12A1 3) SWITCH S6 4) 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: ONORBIT: 3/3 AOA: 3/3 ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1S6
PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE. (START UP HEATER DISCONNECTED ON FCP 1.)

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE:

FLIGHT: 3/1R SUBSYSTEM: EPD&C 3/1R ABORT: MDAC ID: 2014

SWITCH, FC NO 2,3, STARTUP HEATER ITEM:

FAILURE MODE: FAILS TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- SWITCH S7, S8 4)
- 5)
- 6) 7)
- 8)
- PSA 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

32V73A12A1S7,S8 LOCATION: PART NUMBER: ME452-0102-7101

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO INHIBIT A FCP HEATER. EVENTUAL LOSS OF FCP AND POSSIBLE LOSS OF CREW/VEHICLE WITH MULTIPLE FCP FAILURES.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2015

ABORT:

3/1R

ITEM:

SWITCH, FC NO 2,3, STARTUP HEATER

FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) SWITCH S7, S8
- 5)
- 6)
- 7)
- 8) PSA
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A12A1S7,S8 PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO INHIBIT A FCP HEATER. EVENTUAL LOSS OF FCP DUE TO OVER TEMP. POSSIBLE LOSS OF CREW/VEHICLE WITH MULTIPLE FAILURES.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2016 RESISTOR, 1.2K ITEM: FAILURE MODE: ALL CREDIBLE MODES. LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A6R1
- 5)
- 6)
- 7)
- 8) PSA
- 9) 05-6MA

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HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		*
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

REDUNDANCY SCREENS: A [ ] B [ ] C [

LOCATION: 32V73A12A1A6R2 PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE (STARTUP HEATER DISCONNECTED ON FCP 1).

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2017 ABORT: 3/1R

ITEM: RESISTOR, 1.2K

FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTORS A7R1, A8R1

5)

6)

7) 8)

8) PSA 9) 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

32V73A12A1A7R1, A8R1

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

## EFFECTS/RATIONALE:

PROVIDES CURRENT PROTECTION FROM CONT BUS'S TO FCP'S. LOSS OF STARTUP HEATING OF FCP AND POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FCP.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2018 ABORT: 3/3

ITEM: RESISTOR, 1.2K

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTORS A7R1, A8R1
- 5) 6)
- 7)
- 8) PSA
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1A7R1, A8R1

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86 SUBSYSTEM: EPD&C MDAC ID: 2019	HIGHEST (	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: RESISTOR, 5.1K, 1/4W FAILURE MODE: ALL CREDIBLE MODES			
LEAD ANALYST: J. PATTON SUBSY	s lead: K.	SCHMECKPEP	ER
BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R12A1 4) RESISTORS A6R2, A7R2, A8R2 5) 6)		e e	ting
7) 8) PSA 9) 05-6MA			
CRITICAL	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT RTLS TAL: AOA: ATO:	3; 3/3 3/3	
REDUNDANCY SCREENS: A [ ] LOCATION: 32V73A12A1A6R2, A7R2, PART NUMBER: RLR07C512GR	B [ ]	c[]	
CAUSES: OPEN, SHORT, PARAMETER DEVI	IATION		
EFFECTS/RATIONALE:			
			. 시설정인 소설탕
REFERENCES:			

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: 2020 MDAC ID: RESISTOR, 5.1K, 1/4W ITEM: FAILURE MODE: ALL CREDIBLE MODES LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R1A2 RESISTORS A2R3, A2R8, A2R9 4) 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ 32V73A1A2A2R3, A2R8, A2R9 LOCATION: PART NUMBER: RLR07C512GR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

REFERENCES:

NONE.

EFFECTS/RATIONALE:

DATE: 11/25/86 SUBSYSTEM: EPD&C MDAC ID: 2021			ITICALITY FLIGHT: ABORT:	3/3 3/3
ITEM: RESIST FAILURE MODE: ALL CRI				
LEAD ANALYST: J. PATTO	ON SUBSY	S LEAD: K. S	SCHMECKPEP	ER
BREAKDOWN HIERARCHY:  1) EPG 2) FUEL CELL 3) MID PCA 1,2,3 4) RESISTORS AIR14, 5) 6) 7)	AlR14, AlR13			
8) PSA				<u>.</u>
9) 05-6MA			•	
	CRITICAL	ITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUN	С
PRELAUNCH:	3/3	RTLS:		
LIFTOFF:	3/3 3/3 3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3		<b>5,</b> 5	
REDUNDANCY SCREENS:	A [ ] I	3 [ ]	c [ ]	And the second of the second o
LOCATION: 40V76A2! PART NUMBER: RWR80S12	5AlR14, 6AlR14, 211FR	, 7A1R13	· · · · · · · · · · · · · · · · · · ·	
CAUSES: CONTAMINATION SHOCK	, THERMAL STRE	ESS, VIBRATI	ON, MECHAI	NICAL
EFFECTS/RATIONALE: NONE (LOSS OF MEASURE)	MENT ONLY).			
REFERENCES:			* ;	

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2022 ABORT: 3/1R

ITEM: DIODE, ISOLATION

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- 4) DIODES A1CR9, 10, 10, 9, 10, 9
- 5)
- 7)
- 8) PSA
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:			. •

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25A1CR9, 10 (REF)

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

## EFFECTS/RATIONALE:

LOSS OF ABILITY FOR VEHICLE COMMANDS TO CONTROL START POWER TO ASSOCIATED FCP. REDUNDANCY AT SUBSYTEM LEVEL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO MULTIPLE FCP FAILURES.

REFERENCES: ALSO DIODES 40V76A26A1CR10, A1CR9 AND 40V76A27A1CR10, A1CR9

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2023 DIODE, ISOLATION ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA 1,2,3 4) DIODES AICR9, 10, 10, 9, 10, 9 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 TAL: 3/3 AOA: 3/3 3/3 PRELAUNCH: 3/3 3/3 LIFTOFF: 3/3 ONORBIT: ATO: 3/3 ---DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A25A1CR9, 10 (REF) PART NUMBER: JANTXV1N4246 CAUSES: THERMAL STRESS, CONTAMINATION EFFECTS/RATIONALE: NONE. REFERENCES: ALSO DIODES 40V76A26A1CR10, A1CR9 AND 40V76A27A1CR10, A1CR9

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: ABORT:

3/1R 3/1R

MDAC ID:

2024

HYBRID DRIVER CONTROLLER, TYPE I, AR9, AR8, AR8

ITEM: FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- HDC AR9, AR8, AR8 4)
- 5)
- 6)
- 7)
- 8) PSA
- 05-6MA 9)

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:			•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V76A25AR9, 6AR8, 7AR8

PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

LOSS OF VEHICLE COMMANDS TO HDC TO START ASSOCIATED FCP.

REDUNDANCY AT SUBSYSTEM LEVEL. POSSIBLE LOSS OF CREW/VEHICLE

AFTER LOSS OF MULTIPLE FCP.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2025 HYBRID DRIVER CONTROLLER, TYPE I, AR9, AR8, AR8 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1 9:213 8 8 8 6 1) EPG 2) FUEL CELL 3) MID PCA 1,2,3 4) HDC AR9, AR8, AR8 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES CRITICALITIES

HDW/FUNC ABORT HDW/FUNC

3/3 RTLS: 3/3

3/3 TAL: 3/3

3/3 AOA: 3/3

3/3 ATO: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] 40V76A25AR9, 6AR8, 7AR8 LOCATION: PART NUMBER: MC477-0261-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: MDAC ID: 2026 DIODE, ISOLATION ITEM: FAILURE MODE: OPEN LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) 3) MID PCA 1 DIODES ALCR11, 12, 13, 14 4) 5) 6)

7) 8) PSA 9) 05-6MA

CRITICALITIES

	V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25A1CR11, 12, 13, 14

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86 SUBSYSTEM: EPD&C MDAC ID: 2027		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: DIODE, I FAILURE MODE: SHORT (D		K)		
LEAD ANALYST: J. PATTON	SUBSYS	S LEAD: K.	SCHMECKPEP	ER
BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA 1 4) DIODES AlCR11, 12, 5) 6)	13, 14	-		
7) 8) PSA 9) 05-6MA			· · · · · · · · · · · · · · · · · · ·	
	CRITICAL	rmtre		
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	DW/FUNC 3/3 3/3 3/3 3/3	ABORT RTLS: TAL: AOA: ATO:	3/3 3/3	<b>c</b>
REDUNDANCY SCREENS: A	[ ]	3 [ ]	c [ ]	<u></u>
LOCATION: 40V76A25A PART NUMBER: JANTXV1N4	1CR11, 12, 13	3, 14		
CAUSES: THERMAL STRESS	. CONTAMINATI	ON.		
EFFECTS/RATIONALE: NONE.				<del></del>
DEFEDENCES.				

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2028 DIODE, ISOLATION ITEM: FAILURE MODE: OPEN SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA-2 DIODES AlCR14, 13, 12, 11 4) 5) 6) 7) 8) PSA 05-6MA CRITICALITIES HDW/FUNC FLIGHT PHASE HDW/FUNC ABORT RTLS: 3/3 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 A[] B[] REDUNDANCY SCREENS: LOCATION: 40V76A26A1CR14, 13, 12, 11 PART NUMBER: JANTXV1N4246 CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION EFFECTS/RATIONALE:

REFERENCES:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2029 DIODE, ISOLATION ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA-2 DIODES A1CR14, 13, 12, 11 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 PRELAUNCH: 3/3 TAL: LIFTOFF: 3/3 3/3 3/3 ONORBIT: 3/3 AOA: DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] 40V76A26A1CR14, 13, 12, 11 LOCATION: PART NUMBER: JANTXV1N4246 CAUSES: THERMAL STRESS, CONTAMINATION EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: ABORT: 3/3 2030 ITEM: DIODE, ISOLATION FAILURE MODE: OPEN SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: EPG 1) 2) FUEL CELL MID PCA-3 3) 4) DIODES A1CR14, 13, 12, 11 5) 6) 7) 8) PSA 05-6MA CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		•
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

40V76A27A1CR14, 13, 12, 11

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2031 DIODE, ISOLATION ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA-3 4) DIODES AlCR14, 13, 12, 11 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A27A1CR14, 13, 12, 11 PART NUMBER: JANTXV1N4246 CAUSES: THERMAL STRESS, CONTAMINATION EFFECTS/RATIONALE: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2032 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, TYPE 1, AR10, 11, 9, 10,

9, 10

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- 4) HDC AR10, 11, 9, 10, 9, 10
- 5)
- 6)
- 7)
- 8) PSA
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:			•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25AR10, 11 (REF)

PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF VEHICLE COMMAND AND MANUAL CAPABILITY (SWITCH S16) TO

STOP ASSOCIATED FCP. REDUNDANCY AT CIRCUIT LEVEL.

REFERENCES: 40V76A26AR9, AR10, 40V76A27AR9, AR10

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R

MDAC ID: 2033 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, TYPE 1, AR10, 11, 9, 10,

9, 10

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- 4) HDC AR10, 11, 9, 10, 9, 10
- 5)
- 6) 7)
- 8) PSA
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R _
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		i e t

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25AR10, 11 (REF)

PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF VEHICLE COMMAND AND MANUAL CAPABILITY (SWITCH S16) TO STOP ASSOCIATED FCP. REDUNDANT HDC INHIBITS FCP SHUTDOWN.

REFERENCES: 40V76A26AR9, AR10, 40V76A27AR9, AR10

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: MDAC ID: 2034 EVENT INDICATOR, FC READY FOR LOAD ITEM: FAILURE MODE: ANY CREDIBLE FAILURE LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: EPG 2) FUEL CELL 3) PNL R1A2 4) EVENT INDICATOR DS11, 12, 13 5) 6) 7) PSA 8) 05-6MA 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 PRELAUNCH: 3/3 3/3 LIFTOFF: TAL: ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A[] B[] C [ ] LOCATION: 32V73A1A2DS11, 12, 13 PART NUMBER: MC432-0222-0027 CAUSES: VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE, LOSS OF INPUT EFFECTS/RATIONALE: NONE.

HDW/FUNC HIGHEST CRITICALITY 11/25/86 DATE: 3/3 SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/3 MDAC ID: 2035 EVENT INDICATOR, FC COOLANT PUMP DELTA P ITEM: FAILURE MODE: ANY CREDIBLE FAILURE SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R1A2
- 4) EVENT INDICATOR DS14, 15, 16
- 5) 6)
- 7)
- 8) PSA
- 9) 05-6MA

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		·
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

32V73A1A2DS14, 15, 16

PART NUMBER: MC432-0222-0027

CAUSES: VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE, LOSS OF

INPUT

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 MDAC ID: 2036 ABORT: EVENT INDICATOR, FC GPC PURGE SEQ DS1 ITEM: FAILURE MODE: ANY CREDIBLE FAILURE LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R12A1 EVENT INDICATOR DS1 4) 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 PRELAUNCH: 3/3 3/3 TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: DEORBIT: ATO: 3/3 . 3/3 LANDING/SAFING: 3/3 C [ ] REDUNDANCY SCREENS: B [ ] A [ ] LOCATION: 32V73A12A1DS1 PART NUMBER: MC432-0222-0027

VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE, LOSS OF CAUSES:

INPUT

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2037 ITEM: SWITCH, TOGGLE SELECTOR, FCP TEMP. FAILURE MODE: FAILS TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER-BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL 01, 02, 03 4) SWITCH S3 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 RTLS: 3/3 PRELAUNCH: TAL: 3/3 3/3 LIFTOFF: AOA: ONORBIT: 3/3 3/3 ATO: DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 33V73A1S3 PART NUMBER: ME452-0102-7106 CAUSES: STRUCTURAL FAILURE, CONTAMINATION EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: 2038 MDAC ID: SWITCH, TOGGLE SELECTOR, FCP TEMP. ITEM: FAILURE MODE: SHORTS, INADVERTENTLY CLOSES SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: EPG 2) FUEL CELL 3) PNL 01, 02, 03 SWITCH S3 4) 5) 6) 7) 8) PSA 05-6MA 9) CRITTCALITTES.

	C1(T T T C1)		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3	•	-

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

33V73A1S3

PART NUMBER: ME452-0102-7106

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 SUBSYSTEM: EPD&C FLIGHT: 3/3 3/3 ABORT: MDAC ID: 2039 METER, FCP STACK OUTLET COOLANT TEMP ITEM: FAILURE MODE: PEGS HIGH OR LOW LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL 01, 02, 03
- METER, M4 4)
- 5)
- 6)
- 7)
- PSA 8)
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

33V73A1M4

PART NUMBER: MC432-0238-0019

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/3 2040 MDAC ID: METER, FCP STACK OUTLET COOLANT TEMP ITEM: FAILURE MODE: PARAMETER DEVIATION SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) 3) PNL 01, 02, 03 METER, M4 4) 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC HDW/FUNC ABORT FLIGHT PHASE 3/3 3/3 RTLS: PRELAUNCH: TAL: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 AOA: 3/3 3/3 DEORBIT: 3/3 ATO: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [

LOCATION: 33V73A1M4

PART NUMBER: MC432-0238-0019

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2041 ITEM: SIGNAL CONDITIONER NO. 1 FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID BODY SIGNAL CONDITIONER NO. 1 DSC OM1 4) 5) 6) 7) 8) **PSA** 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 3/3 PRELAUNCH: RTLS: LIFTOFF: 3/3 TAL: 3/3 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A[] B[] C[]

LOCATION: 40V75A23
PART NUMBER: V070-754161

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2042 ITEM: SIGNAL CONDITIONER NO. 1 FAILURE MODE: ZERO OUTPUT WITH RECORD TO INPUT LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL MID BODY 3) SIGNAL CONDITIONER NO. 1 DSC OM1 4) 5) 6) 7) PSA 8)

CRITICALITIES

01/T T T 01177 T T T T T T T T T T T T T T T T T T			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	<sup>-</sup> 3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V75A23
PART NUMBER: V070-754161

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

05-6MA

9)

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2043 ITEM: SIGNAL CONDITIONER NO. 1 FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID BODY SIGNAL CONDITIONER NO. 1 DSC OM1 4) 5) 6) 7) 8) PSA 05-6MA 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 3/3. ONORBIT: AOA: DEORBIT: ATO: 3/3 3/3 LANDING/SAFING: 3/3 C [ ] · \*\*\*\*\*\*\*\*\*\* REDUNDANCY SCREENS: Arl Bri LOCATION: 40V75A23 PART NUMBER: V070-754161 CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2044 ITEM: SIGNAL CONDITIONER NO. 2 FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: EPG 1) 2) FUEL CELL MID BODY 3) SIGNAL CONDITIONER NO. 2 DSC OM2 4) 5) 6) 7) PSA 8) 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 RTLS: 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V75A74 PART NUMBER: V070-754162 CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

REFERENCES:

NONE.

EFFECTS/RATIONALE:

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 SUBSYSTEM: EPD&C FLIGHT: 3/3 3/3 MDAC ID: 2045 ABORT: SIGNAL CONDITIONER NO. 2 ITEM: FAILURE MODE: ZERO OUTPUT WITH REGARD TO INPUT LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID BODY 4) SIGNAL CONDITIONER NO. 2 DSC OM2 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES HDW/FUNC ABORT FLIGHT PHASE HDW/FUNC RTLS: PRELAUNCH: 3/3 3/3 LIFTOFF: 3/3 TAL: 3/3 AOA: ATO: ONORBIT: 3/3 3/3 DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V75A74 PART NUMBER: V070-754162 CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION EFFECTS/RATIONALE: NONE.

HDW/FUNC HIGHEST CRITICALITY DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2046 SIGNAL CONDITIONER NO. 2 ITEM: FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG

2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 2 DSC OM2
5)
6)
7)

8) PSA 9) 05-6MA

CRITICALITIES

	V-1 V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V75A74
PART NUMBER: V070-754162

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2047 ITEM: SIGNAL CONDITIONER DSC OF3 FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) MID BODY SIGNAL CONDITIONER DSC OF3 5) 6) 7) 8) PSA 05-6MA 9) CRITICALITIES HDW/FUNC HDW/FUNC FLIGHT PHASE ABORT PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3----3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: B [ ] C [ ] A [ ] LOCATION: 83V75A18 PART NUMBER: V070-753263 CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2048 ITEM: SIGNAL CONDITIONER DSC OF3 FAILURE MODE: ZERO OUTPUT WITH REGARD TO INPUT SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: EPG 1) FUEL CELL 2) MID BODY 3) SIGNAL CONDITIONER DSC OF3 4) 5) 6) 7) PSA 8) 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 83V75A18 PART NUMBER: V070-753263 CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

REFERENCES:

NONE.

EFFECTS/RATIONALE:

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2049 ITEM: SIGNAL CONDITIONER DSC OF3 FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID BODY 4) SIGNAL CONDITIONER DSC OF3 5) 6) 7) 8) PSA 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 3/3 RTLS: PRELAUNCH: TAL: LIFTOFF: 3/3 3/3 3/3 AOA: ONORBIT: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 83V75A18 PART NUMBER: V070-753263 CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: 2050 MDAC ID:

SIGNAL CONDITIONER DSC OA2 ITEM:

FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- MID BODY 3)
- SIGNAL CONDITIONER DSC OA2 4)
- 5) 6)
- 7)
- 8) PSA
- 9) 05-6MA

CRITICALITIES

	<b>4012 0 0 44</b>		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		-

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 55V75A20 PART NUMBER: V070-755262

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

EFFECTS/RATIONALE:

NONE.

	: YSTEM: ! ID:		5		HIGHEST	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM FAIL		SIGNAI E: ZERO C					, <u>,</u> .
LEAD	ANALYST	r: J. Pati	ON	SUBSYS	LEAD: F	. SCHMECKPE	PER _ · · · ·
1) 2) 3)	EPG FUEL CE MID BOI		IER DSC C	A2		<b>-</b>	
	PSA 05-6MA						
9)	US-6MA						
	LIFTO ONORE DEORE	AUNCH: OFF: BIT:	HDW/FUN 3/3 3/3 3/3 3/3		FIES ABORT RTL TAL AOA ATO	S: 3/3 : 3/3 : 3/3	ic
REDU	NDANCY S	CREENS:	A [ ]	В	[ ]	c [ ]	1 1 1 1 1 1 A 4
		55V75A2 V070-75					
	ES: STR AMINATIO		AILURE,	MECHANI(	CAL SHOC	K, VIBRATION	٧,
EFFE NONE	CTS/RATI •	ONALE:					
REFE	RENCES:			·			uli luli sisselæ.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2052 ABORT: 3/3

ITEM:

SIGNAL CONDITIONER DSC OA2

FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID BODY
- 4) SIGNAL CONDITIONER DSC OA2
- 5) 6)
- 7)
- 8) PSA
- 9) 05-6MA

CRITICALITIES

	<b>4.14 4.1</b>		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	′3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 55V75A20
PART NUMBER: V070-755262

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

EFFECTS/RATIONALE:

NONE.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

3/1R

SUBSYSTEM: EPD&C MDAC ID:

2053

FLIGHT: ABORT:

3/1R

ITEM:

SWITCH, FUEL CELL GPC PURGE SEQ

FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO

CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) SWITCH Sl

5)

6)

7)

- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

TWINDTING\ DWLTING: 3\2

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1S1

PART NUMBER: ME452-0102-7102

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

### EFFECTS/RATIONALE:

FUNCTION: INITIATES AUTO-PURGE SEQUENCE CYCLE THROUGH GPC AND

CONDUCTS POWER TO MDM PF2.

EFFECTS: LOSS OF ABILITY TO AUTOMATICALLY PURGE FUEL CELL THROUGH

THE GPC. MANUAL FC PURGE AVAILABLE. POSSIBLE LOSS OF

CREW/VEHICLE DUE TO LOSS OF ALL POWER.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2054 ABORT: 3/3

ITEM: SWITCH, FUEL CELL GPC PURGE SEQ FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) SWITCH S1
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1S1 PART NUMBER: ME452-0102-7102

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:

FUNCTION: INITIATES AUTO-PURGE SEQUENCE CYCLE THROUGH GPC AND

CONDUCTS POWER TO MDM PF2.

EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2055

ABORT:

3/1R

ITEM:

RESISTOR, 5.1K 1/4 W

FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL R12A1
- RESISTOR A1R2 4)

5)

6)

7)

8) RCS

9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A12A1A1R2

PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE: ALUTE ACHIELLE ACHIELLE ALUTE ACHIELLE ACHIELLE ALUTE ACHIELLE AC

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 3AB TO FC GPC PURGE SEQ SWITCH (S1).

EFFECTS: LOSS OF PWR TO GPC PURGE SEQ SWITCH WHICH THEN WILL

REQUIRE MANUAL PURGE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2056 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4 W

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A1R2
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

CRITICALITIES

HDW/FUNC
S: 3/3
3/3
: 3/3
3/3
•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1A1R2 PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 3AB TO FC

GPC PURGE SEQ SWITCH (S1).

EFFECTS: NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2057

ABORT:

C[P]

3/1R

ITEM:

SWITCH, FUEL CELL PURGE HEATER

FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO

CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12Al
- SWITCH S2 4)
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ]

LOCATION: 32V73A12A1S2 PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

#### EFFECTS/RATIONALE:

FUNCTION: PROVIDES THE ABILITY TO HEAT AUTOMATIC PURGE LINE BY GPC IN CONJUNCTION WITH S1 IN "GPC" POSITION OR MANUALLY IN "ON" POSITION.

EFFECTS: LOSS OF FC PURGE HTRS. POSSIBLE LOSS OF ABILITY TO PURGE FC'S. POSSIBLE MISSION LOSS DUE TO DEGREDATION OF FC PERFORMANCE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2058 ABORT: 3/3

ITEM: SWITCH, FUEL CELL PURGE HEATER FAILURE MODE: SHORTS, INADVERTANTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) SWITCH S2
- 5)
- 6)
- 7)
- 8) RCS 9) 05-6MA

### CRITICALITIES

	41/11411111111		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1S2 PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

FUNCTION: PROVIDES THE ABILITY TO HEAT AUTOMATIC PURGE LINE BY GPC IN CONJUNCTION WITH S1 IN "GPC" POSITION OR MANUALLY IN "ON" POSITION.

EFFECTS: NONE.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

3/1R FLIGHT: ABORT: 3/1R

MDAC ID: 2059

RESISTOR, 5.1K 1/4 W

FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

1) EPG

ITEM:

- FUEL CELL 2)
- 3) PNL R12A1
- 4) RESISTOR A2R2

5)

6) 7)

8) RCS

9) 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
TAMBTMO /OATTMO.	ก้าว		-

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A12A1A2R2

PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 2CA TO FC Praticipal and the

PURGE HTR SWITCH S2 AND MDM OF4.

EFFECTS: LOSS OF FC PURGE HTR POWER AND ABILITY TO SAFELY PURGE FC'S. POSSIBLE LOSS OF MISSION DUE TO DEGREDATION OF FC

PERFORMANCE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2060 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4 W

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A2R2
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3		•	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1A2R2
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 2CA TO FC

PURGE HTR SWITCH S2 AND MDM OF4.

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/2R SUBSYSTEM: EPD&C 3/2R ABORT: MDAC ID: 2061 RESISTOR, 1.2K 2W ITEM: FAILURE MODE: ELEMENT OPENS, HI-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R12A1 4) RESISTOR A1R3 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 3/2R 3/2R RTLS: TAL: AOA: 3/2R PRELAUNCH: 3/2R 3/2R LIFTOFF: ONORBIT: 3/2R ATO: 3/2R DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 32V73A12A1A1R3 PART NUMBER: RWR80S1211FR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK EFFECTS/RATIONALE: FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS CA1 AND FC PURGE HTR SWITCH (S2). EFFECTS: LOSS OF ABILITY TO POWER PURGE HTRS CONTROLLED BY SWITCH (S2). POSSIBLE LOSS OF MISSION DUE TO DEGRADED FC PERFORMANCE. REFERENCES:

HDW/FUNC HIGHEST CRITICALITY 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT:

MDAC ID: 2062

RESISTOR, 1.2K 2W ITEM:

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

## BREAKDOWN HIERARCHY:

- EPG 1)
- 2) FUEL CELL
- 3) PNL R12A1
- RESISTOR A1R3 4)
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

CRITICALITIES

CLITTONDITIO			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

B[] C[] REDUNDANCY SCREENS: A [ ]

LOCATION: 32V73A12A1A1R3 PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS CA1 AND FC

PURGE HTR SWITCH (S2).

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 FLIGHT: 3/2R ABORT: 3/2R SUBSYSTEM: EPD&C MDAC ID: 2063 ITEM: RESISTOR, 1.2K 2W FAILURE MODE: ELEMENT OPENS, HI-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R12A1 4) RESISTOR A2R3 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES CRITICALITIES

FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/2R
LIFTOFF: 3/2R TAL: 3/2R
ONORBIT: 3/2R AOA: 3/2R DEORBIT: 3/2R ATO: 3/2R LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 32V73A12A1A2R3
PART NUMBER: RWR80S1211FR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK EFFECTS/RATIONALE: FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS BC1 AND FC PURGE HTR SWITCH (S2).

EFFECTS: LOSS OF ABILITY TO POWER PURGE HTRS CONTROLLED BY SWITCH (S2). POSSIBLE LOSS OF MISSION DUE TO DEGRADED FC PERFORMANCE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2064

RESISTOR, 1.2K 2W ITEM:

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PNL R12A1 3)
- RESISTOR A2R3 4)
- 5)
- 6)
- 7)
- RCS 8)
- 05-6MA

### CRITICALITIES

VI.E = 0 VI.			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [

LOCATION: 32V73A12A1A2R3 PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS BC1 AND FC

PURGE HTR SWITCH (S2).

EFFECTS: NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2065

FLIGHT: ABORT:

3/2R 3/2R

ITEM:

RESISTOR, 5.1K 1/4W

FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A2R1, A1R1

6)

7)

- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3	•	•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1A2R1 32V73A12A1A1R1

PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

### EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN FC PURGE HTR SWITCH (S2) AND MDM OF4 AND FC GPC PURGE SEQ FLAG (DS1) AND MDM OF4. EFFECTS: LOSS OF ABILITY TO DO GPC AUTO PURGE FOR FC. MAY RESULT IN FC DEGREDATION AND CAUSE MISSION LOSS.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2066 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A2R1, A1R1
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

32V73A12A1A2R1 32V73A12A1A1R1

PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN FC PURGE HTR SWITCH (S2) AND MDM OF4 AND FC GPC PURGE SEQ FLAG (DS1) AND MDM OF4.

EFFECTS: NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

FLIGHT:

3/2R 3/2R

2067

ABORT:

ITEM:

REMOTE POWER CONTROLLER, 5 AMP

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY

OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PCA-1 3)
- 4) RPC-25
- 5)
- 6)
- 7)
- 8) RCS
- 05-6MA

## CRITICALITIES =

	V-12 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/2R	
LIFTOFF:	3/2R	TAL:	3/2R	
ONORBIT:	3/2R	AOA:	3/2R	
DEORBIT:	3/2R	ATO:	3/2R	
LANDING/SAFING:	3/3		= -	

wintig/ saltig:

REDUNDANCY SCREENS: A [ 1 ]

B [NA] C [P]

LOCATION:

40V76A25RPC25

PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK,

VIBRATION

EFFECTS/RATIONALE:

FUNCTION: CONDUCTS MAIN A PWR TO STANDBY HEATERS OF PURGE LINE

HTRS WHEN SWITCH S2 IN "ON" POSITION.

EFFECTS: LOSS OF STANDBY HTRS OF O2 AND H2 PURGE LINES. ALTERNATE

PATHS TO POWER HTRS AVAILABLE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2068 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER, 5 AMP

FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) RPC-25
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

CRITICALITIES

	~			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25RPC25
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

FUNCTION: CONDUCTS MAIN A PWR TO STANDBY HEATERS OF PURGE LINE

HTRS WHEN SWITCH S2 IN "ON" POSITION.

EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT:

3/2R

MDAC ID:

2069

ABORT: 3/2R

ITEM: REMOTE POWER CONTROLLER, 5 AMP

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTANTLY

OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-3
- RPC-14 4)
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/2R	
LIFTOFF:	3/2R	TAL:	3/2R	
ONORBIT:	3/2R	AOA:	3/2R	
DEORBIT:	3/2R	ATO:	3/2R	
TANDING / SAFING	3/3		•	

LANDING/SAFING: 3/3

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

LOCATION: 40V76A27RPC14

PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK,

VIBRATION

EFFECTS/RATIONALE:

EFFECTS: LOSS OF PRIMARY HTRS OF O2 AND H2 PURGE LINE. ALTERNATE

PATHS TO POWER HTRS AVAILABLE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2070 REMOTE POWER CONTROLLER, 5 AMP ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-3 RPC-14 4) 5) 6) 7)

CRITICALITIES

	CKITICADITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A27RPC14
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE: EFFECTS: NONE.

REFERENCES:

RCS

05-6MA

8) 9)

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2071

FLIGHT: ABORT:

3/2R 3/2R

ITEM:

REMOTE POWER CONTROLLER, 5 AMP

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL PCA-3 2)
- 3)
- RPC-15 4)
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

40V76A27RPC15

PART NUMBER: MC450-0017-1050

CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL

FAILURE

## EFFECTS/RATIONALE:

EFFECTS: LOSS OF PRIMARY HTRS OF O2 AND H2 PURGE LINE. ALTERNATE PATHS TO POWER HTRS AVAILABLE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2072 REMOTE POWER CONTROLLER, 5 AMP ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PCA-3 3) RPC-15 4) 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 3/3 PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] LOCATION: 40V76A27RPC15 PART NUMBER: MC450-0017-1050 CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE:

REFERENCES:

EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/2R

MDAC ID: 2073

ABORT:

3/2R

ITEM:

REMOTE POWER CONTROLLER, 5 AMP

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) RPC-26
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A26RPC26

PART NUMBER: MC450-0017-1050

CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL

FAILURE

EFFECTS/RATIONALE:

EFFECTS: LOSS OF PRIMARY HTRS OF O2 AND H2 PURGE LINE. ALTERNATE

PATHS TO POWER HTRS AVAILABLE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2074 REMOTE POWER CONTROLLER, 5 AMP ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) 3) PCA-2 RPC-26 4) 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 3/3 PRELAUNCH: TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A26RPC26 PART NUMBER: MC450-0017-1050 CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

REFERENCES:

EFFECTS/RATIONALE: EFFECTS: NONE.

11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

FLIGHT: 3/2R

2075

ABORT:

3/2R

ITEM:

DIODE, ISOLATION

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) DIODES A2CR9, A2CR10

5)

6)

7)

8) RCS

9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		• · ·

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION: 40V76A25A2CR9, 40V76A25A2CR10

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

FUNCTION: POSSIBLE LOSS OF MISSION DUE TO INABILITY FOR BOTH

REDUNDANT PATHS TO PURGE FC.

EFFECTS: LOSS OF ABILITY TO MONITER RPC GPC PURGE STATUS.

ALTERNATE METHODS OF MONITERING PURGE AVAILABLE.

DATE: 11/25/86 SUBSYSTEM: EPD&C MDAC ID: 2076			ITICALITY FLIGHT: ABORT:	HDW/FUN 3/3 3/3
ITEM: DIODE, FAILURE MODE: SHORT	ISOLATION (DOES NOT BLOCK	К)		
LEAD ANALYST: J. PATT	ON SUBSYS	E LEAD: K.	SCHMECKPEP	ER
BREAKDOWN HIERARCHY:  1) EPG 2) FUEL CELL 3) PCA-1 4) DIODES A2CR9, A2 5) 6) 7) 8) RCS	CR10			
9) 05-6MA				
	CRITICAL	TTES		
FLIGHT PHASE	HDW/FUNC		HDW/FUN	iC .
PRELAUNCH:	3/3	RTLS:		
LIFTOFF:		TAL:	3/3	
ONORBIT:	3/3 3/3	AOA:		
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING	3/3		-	
REDUNDANCY SCREENS:	A [ ] I	3 [ ]	c [ ]	
LOCATION: 40V76A2 PART NUMBER: JANTXV1		25A2CR10		
CAUSES: THERMAL STRE	SS, CONTAMINAT	ION		
EFFECTS/RATIONALE:				
EFFECTS: NONE.				

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/3 MDAC ID: 2077 ITEM: RESISTOR, 2.2K & 1.8K FAILURE MODE: ELEMENT OPENS, HI-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-1, PCA-3 RESISTOR AIR8, AIR7 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 3/3 RTLS: LIFTOFF: 3/3 TAL: 3/3 ONORBIT: AOA: 3/3 3/3 DEORBIT: ATO: 3/3 3/3 3/3 LANDING/SAFING:

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25A1R8,A1R7 40V76A27A1R8,A1R7

PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

HDW/FUNC HIGHEST CRITICALITY 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2078 RESISTOR, 2.2K & 1.8K ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: EPG 1) 2) FUEL CELL PCA-1 3) RESISTOR AIR8, AIR7 4) 5) 6) 7) RCS 8) 05-6MA 9) **CRITICALITIES** HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 3/3 RTLS: PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A25A1R8,A1R7 40V76A27A1R8,A1R7

PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2079 ABORT: RESISTOR, 2.2K & 1.8K ITEM: FAILURE MODE: ELEMENTS OPENS, HI-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-2, PCA-3 4) RESISTORS AIR12, AIR11, AIR10, AIR9 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 PRELAUNCH: 3/3 RTLS: TAL: LIFTOFF: 3/3 3/3 ONORBIT: 3/3 AOA: 3/3 3/3 3/3 DEORBIT: ATO: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] 40V76A26A1R12, A1R11 40V76A26A1R10, A1R9 PART NUMBER: RLR07C182GR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK EFFECTS/RATIONALE: NONE. REFERENCES:

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: 3/3 MDAC ID: 2080 RESISTOR, 2.2K & 1.8K ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: EPG 1) FUEL CELL 2) 3) PCA-2, PCA-3 RESISTORS AIR12, AIR11, AIR10, AIR9 4) 5) 6) 7)

CRITICALITYES

	CKITICADITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A26A1R12, A1R11 40V76A27A1R10, A1R9

PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

REFERENCES:

RCS

05-6MA

8) 9)

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/2R MDAC ID: 2081 ABORT: 3/2R

ITEM: DIODE, ISOLATION

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) DIODES A2CR11, A2CR12
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		-

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION: 40V76A26A2CR11, 40V76A26A2CR12

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

LOSS OF ABILITY TO MONITER RPC GPC PURGE STATUS. ALTERNATE

METHODS TO MONITER STATUS AVAILABLE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2082 DIODE, ISOLATION ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: EPG 1) 2) · FUEL CELL PCA-2 3) DIODES A2CR11, A2CR12 4) 5) 6) 7) 8) RCS 9) 05-6MA

CRITICALITIES

	V-1			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING	: 3/3		•	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A2

40V76A26A2CR11, 40V76A26A2CR12

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/2R

MDAC ID:

2083

ABORT:

3/2R

ITEM:

FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- FUSE F15 4)
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/2R	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A26F15

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

LOSS OF MONITERING OF HEATER STATUS WHEN GPC AUTO PURGE IS SELECTED. ALTERNATE METHODS TO MONITER STATUS AVAILABLE.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

3/1R FLIGHT:

MDAC ID:

2084

ABORT:

3/1R

ITEM:

CIRCUIT BREAKER, FC #1 THERMAL

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- EPG 1)
- 2) FUEL CELL
- PNL L4 3)
- CB65, CB66, CB67 4)
- 5)
- 6)
- 7)
- RCS 8)
- 9) 05-6MA

#### CRITICALITIES

41/4 41/11 41			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA;	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

31V73A4CB65, 31V73A4CB66, 31V73A4CB67

PART NUMBER: MC454-0026-2030

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF PUMP MOTOR. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS

OF NECESSARY POWER.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/2R

MDAC ID:

2085

ABORT:

3/2R

ITEM:

SWITCH, FUEL CELL PURGE VALVES

FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO

CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL R12A1
- 4) SWITCH S3, S4, S5

5)

6)

7)

8) RCS

9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	. TAL:	3/2R -
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ]

B[P] C[P]

LOCATION:

32V73A12A1S3, 32V73A12A1S4, 32V73A12A1S5

PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

## EFFECTS/RATIONALE:

REDUNDANCY IN CIRCUIT LEVEL SO ADDITIONAL FAILURES WOULD HAVE TO

OCCUR BEFORE LOSS OF MISSION.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/2R

MDAC ID: 2086 ABORT: 3/2R

ITEM: SWITCH, FUEL CELL PURGE VALVES FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) SWITCH S3, S4, S5
- 5)
- 6) 7)
- ()
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		-

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1S3, 32V73A12A1S4, 32V73A12A1S5

PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

CONTINUOUS PURGE OF FC CAUSING POSSIBLE DEGRADED FUEL CELL

PERFORMANCE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

3/2R SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/2R MDAC ID: 2087

RESISTORS, 1.2 KOHM, 2W ITEM:

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PNL R12A1
- 4) RESISTOR A3R1, A3R2
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
Landing/Safing	: 3/3		

REDUNDANCY SCREENS: A [ 3 ] B [NA ] C [ P ]

LOCATION: 32V73A12A1A3R1, 32V73A12A1A3R2

PART NUMBER: RWR80S1211FR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:

LOSS OF MANUAL PURGE CAPABILITY OF FC 1. DEGRADATION OF FCP

PERFORMANCE AND POSSIBLE LOSS OF FCP.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2088 RESISTORS, 1.2 KOHM, 2W ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORTS LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) 3) PNL R12A1 4) RESISTOR A3R1, A3R2 5) 6) 7) RCS 8) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 3/3 RTLS: PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 3/3 ONORBIT:

ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

32V73A12A1A3R1, 32V73A12A1A3R2 LOCATION:

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/2R 3/2R MDAC ID: 2089 ABORT:

RESISTOR, 5.1K 1/4W ITEM:

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PNL R12A1
- 4) RESISTOR A3R3

5)

6)

7) 8) RCS

9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1A3R3 PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

### EFFECTS/RATIONALE:

CONDUCTS VEHICLE COMMANDS TO FC 1 PURGE VALVE SWITCH S3 FROM MDM-OF4. POSSIBLE LOSS OF MISSION DUE TO DEGRADED FCP PERFORMANCE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2090 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST,

SHORTS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A3R3

5)

6)

7)

8) RCS

9) 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1A3R3
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/2R

MDAC ID: 2091

ABORT:

3/2R

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR1, AR2

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) HDC AR1, AR2

5)

6)

7)

- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/2R	
LIFTOFF:	3/2R	TAL:	3/2R	
ONORBIT:	3/2R	AOA:	3/2R	
DEORBIT:	3/2R	ATO:	3/2R	
LANDING/SAFING:	3/3		· · · · · · · · · · · · · · · · · · ·	

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25AR1, 40V76A25AR2

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

#### EFFECTS/RATIONALE:

LOSS OF REMOTE CONTROL OF POWER TO 02 AND H2 PURGE VALVES OF FCP 1 WHEN S3 IN "GPC" POSITION. ADDITIONAL PATHS AVAILABLE TO POWER VALVE SWITCH HDC.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2092 HYBRID DRIVER CONTROLLER TYPE III AR1, AR2 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) PCA-1 3) HDC AR1, AR2 4) 5) 6) 7) RCS 8) 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 3/3 RTLS: PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 3/3 LANDING/SAFING: REDUNDANCY SCREENS: A [ ] B [ ] C [ ] 40V76A25AR1, 40V76A25AR2 LOCATION: PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: NONE.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

FLIGHT: 3/1R

SUBSYSTEM: EPD&C MDAC ID:

2093

ABORT:

3/1R

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR3, AR4

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PCA-1
- 4) HDC AR3, AR4
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		in the state of th

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V76A25AR3, 40V76A25AR4

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

### EFFECTS/RATIONALE:

LOSS OF REMOTE POWER APPLICATION TO THE O2 AND H2 PURGE VALVES FOR FC 1. POSSIBLE DEGRADED FC PERFORMANCE AND EVENTUAL LOSS OF FCP, RESULTING IN LOSS OF MISSION AND/OR CREW/VEHICLE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/2R

MDAC ID:

2094

ABORT:

3/2R

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR3, AR4

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- HDC AR3, AR4 4)
- 5)
- 6)
- 7)
- RCS 8)
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	: 3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

40V76A25AR3, 40V76A25AR4

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

CONTINUOUS OPEN OF O2 AND H2 PURGE VALVE OF FC 1 CAUSING DEGRADATION OF FCP OUTPUT.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID:

2095

ABORT:

3/1R

ITEM:

CIRCUIT BREAKER, FC #2 THERMAL

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL L4
- 4) CB68, CB69, CB70

5)

6)

7)

8) RCS

9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		-

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 31V73A4CB68, 31V73A4CB69, 31V73A4CB70

PART NUMBER: MC454-0026-2030

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK

<u>a</u>r da sa<del>ntan</del>i gan da ekada baranin gan dari baranin da kabasa da kaban gang EFFECTS/RATIONALE:

PUMP MOTOR WILL FAIL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS

on the season was an expensive and the season of the seaso

OF NECESSARY POWER.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

3/2R FLIGHT: SUBSYSTEM: EPD&C 3/2R ABORT: MDAC ID: 2096

RESISTORS, 1.2 KOHM, 2W ITEM:

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL R12A1
- RESISTOR A4R1, A4R2
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

	A1/4 4 4 A1/		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	AŢO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 3 ] B [NA ] C [ P ]

LOCATION: 32V73A12A1A4R1, 32V73A12A1A4R2 PART NUMBER: RWR80S1211FR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:

LOSS OF MANUAL PURGE CAPABILITY OF FC 2. DEGRADATION OF FCP

PERFORMANCE AND POSSIBLE LOSS OF FCP.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2097 ABORT: 3/3						
ITEM: RESISTORS, 1.2 KOHM, 2W FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORTS						
LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER						
BREAKDOWN HIERARCHY:  1) EPG 2) FUEL CELL 3) PNL R12A1 4) RESISTOR A4R1, A4R2 5) 6) 7) 8) RCS 9) 05-6MA						
CRITICALITIES ===						
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3						
REDUNDANCY SCREENS: A [ ] B [ ] C [ ]						
LOCATION: 32V73A12A1A4R1, 32V73A12A1A4R2 PART NUMBER: RWR8OS1211FR  CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL						
SHOCK						
EFFECTS/RATIONALE:						

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/2R

MDAC ID: 2098 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A4R3
- 5)
- 6) 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

CIVITATION	THE PERCHANGE		
HDW/FUNC	ABORT	HDW/FUNC	
3/3	RTLS:	3/2R	
3/2R	TAL:	3/2R	
3/2R	AOA:	3/2R	
3/2R	ATO:	3/2R	
3/3			
	HDW/FUNC 3/3 3/2R 3/2R 3/2R	3/3 RTLS: 3/2R TAL: 3/2R AOA: 3/2R ATO:	

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1A4R3
PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

## EFFECTS/RATIONALE:

CONDUCTS VEHICLE COMMANDS TO FC 2 PURGE VALVE SWITCH S4 FROM MDM-OF4. POSSIBLE LOSS OF MISSION DUE TO DEGRADED FCP PERFORMANCE.

	SYSTEM:				HIGH	I	TICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
	URE MODI	RESIST	TER DI	EVIATIO	ON, OUT		ERANCE, LO	•
LEAD	ANALYST	: J. PATTO					СНМЕСКРЕ	
1) 2)	KDOWN HI EPG FUEL CE PNL R12	ERARCHY:						
	RESISTO							
8) 9)	RCS 05-6MA				-			
٠,	UJ-UMA			· Hit Still				
				CRITIC	ALITIES	2 -		. 1.
	FLIGHT F	HASE	HDW/F				HDW/FUN	C
	PRELA	UNCH:	3/3			RTLS:	3/3	
	LIFTC	FF:	3/3			TAL:	3/3	
	ONORE	IT:	3/3 3/3			AOA:	3/3	
	DEORE	IT:	3/3			ATO:	3/3	
	LANDI	NG/SAFING:						
REDU	NDANCY S	CREENS:	A [	] .	В [	J	c [ ]	
		32V73A12 RLR07C51		3				
CAUS SHOC		TAMINATION	, THE	RMAL S	TRESS, V	/IBRATI	ON, MECHA	NICAL
effe None	CTS/RATI •	ONALE:						
DB FFF	RENCES:							Bolling London Cons
- r. r r.	RENLEDI							

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

C [ P ]

3/2R

MDAC ID:

2100

ABORT:

3/2R

ITEM:

HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GND

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) HDC AR1, AR2
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

B [ P ]

	V-1 V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING	•		,

LOCATION: 40V76A26AR1, 40V76A26AR2

REDUNDANCY SCREENS: A [ 1 ]

PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

### EFFECTS/RATIONALE:

LOSS OF REMOTE CONTROL OF POWER TO 02 AND H2 PURGE VALVES OF FCP 2 WHEN S4 IS IN "GPC" POSITION. ALTERNATE PATHS AVAILABLE TO POWER HDC.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 SUBSYSTEM: EPD&C FLIGHT: 3/3 2101 ABORT: 3/3 MDAC ID: ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2 FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-2 4) HDC AR1, AR2 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: PRELAUNCH: 3/3 3/3 LIFTOFF: 3/3 TAL: 3/3 AOA: ONORBIT: 3/3 3/3 DEORBIT: ATO: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A26AR1, 40V76A26AR2 PART NUMBER: MC477-0263-002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: NONE. REFERENCES:

HDW/FUNC HIGHEST CRITICALITY DATE: 11/25/86 FLIGHT: 3/1R SUBSYSTEM: EPD&C 3/1R

ABORT: MDAC ID: 2102

HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4 ITEM:

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PCA-2 3)
- HDC AR3, AR4 4)
- 5)
- 6)
- 7)
- RCS 8)
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

40V76A26AR3, 40V76A26AR4 LOCATION:

PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF POWER TO 02 AND H2 PURGE VALVE OPERATION WHEN FCP PURGE VALVE SWITCH S4 IS IN OPEN POSITION. DEGRADATION OF FCP OUTPUT.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/2R

MDAC ID:

2103

ABORT:

3/2R

ITEM:

HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PCA-2
- 4) HDC AR3, AR4
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3	A STATE OF THE STA	rer ee

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V76A26AR3, 40V76A26AR4

PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

CONTINUOUS OPEN OF O2 AND H2 PURGE VALVE OF FCP 2 CAUSING DEGRADATION OF FCP OUTPUT.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 3/1R SUBSYSTEM: EPD&C 3/1R ABORT: 2104 MDAC ID:

ITEM: CIRCUIT BREAKER, FC #3 THERMAL

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL L4
- CB71, CB72, CB73 4)
- 5) 6)
- 7)
- 8) RCS
- 05-6MA 9)

### CRITICALITIES

	42/2 2 2 41		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING			-

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 31V73A4CB71, 31V73A4CB72, 31V73A4CB73

PART NUMBER: MC454-0026-2030

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:

PUMP MOTOR WILL FAIL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS

OF NECESSARY POWER.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/2R

MDAC ID:

2105

ABORT:

3/2R

ITEM:

RESISTORS, 1.2 KOHM, 2W

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A5R1, A5R2

5) 6)

7)

8) RCS

9) 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
TAMBTHA /AARTHA.	0.70		-

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 3 ] B [NA ] C [ P ]

LOCATION: 32V73A12A1A5R1, 32V73A12A1A5R2

PART NUMBER: RWR80S1211FR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:

LOSS OF MANUAL PURGE CAPABILITY OF FC 3. DEGRADATION OF FCP PERFORMANCE AND POSSIBLE LOSS OF FCP.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3

MDAC ID: 2106

RESISTORS, 1.2 KOHM, 2W

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST,

SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PNL R12A1
- 4) RESISTOR A5R1, A5R2
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

CRI	TI	CALI	TIES
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	V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		

B[] C[] REDUNDANCY SCREENS: A [ ]

32V73A12A1A5R1, 32V73A12A1A5R2 LOCATION: PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

3/2R SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/2R MDAC ID: 2107

ITEM: RESISTOR, 5.1K, 1/4W

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTOR A5R3
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1A5R3 PART NUMBER: RLR07C512GR and grant to the state of the st

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

#### EFFECTS/RATIONALE:

CONDUCTS VEHICLE COMMANDS TO FC 3 PURGE VALVE SWITCH S4 FROM MDM-OF4. POSSIBLE LOSS OF MISSION DUE TO DEGRADED FCP PERFORMANCE.

HDW/FUNC HIGHEST CRITICALITY DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: 2108 MDAC ID: RESISTOR, 5.1K, 1/4W ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORT SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PNL R12A1 3) RESISTOR A5R3 4) 5) 6) 7) RCS 8) 05-6MA 9) CRITICALITIES HDW/FUNC HDW/FUNC ABORT FLIGHT PHASE RTLS: 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: 3/3

ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3

C [ ] REDUNDANCY SCREENS: A [ ] B [ ]

LOCATION: 32V73A12A1A5R3 PART NUMBER: RLR07C512GR

CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL CAUSES:

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86 H

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/2R

MDAC ID: 2109 ABORT: 3/2R

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-3
- 4) HDC AR1, AR2

5)

6)

7)

- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING	: 3/3	•	•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A27AR1, 40V76A27AR2

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

LOSS OF REMOTE CONTROL OF POWER TO 02 AND H2 PURGE VALVES OF FCP 3 WHEN S5 IS IN "GPC" POSITION. ALTERNATE POWER PATHS AVAILABLE TO POWER HDC.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2110 HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-3 4) HDC AR1, AR2 5) 6) 7) 8) RCS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 AOA: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 B[] C[] REDUNDANCY SCREENS: A [ ]

LOCATION: 40V76A27AR1, 40V76A27AR2

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2111

ABORT:

3/1R

ITEM:

HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-3
- 4) HDC AR3, AR4
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

	~~·~~~~·		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	3/3		Anterditin

REDUNDANCY SCREENS: A [ 1 ]

B[P] C[P]

LOCATION: 40V76A27AR3, 40V76A27AR4

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

### EFFECTS/RATIONALE:

LOSS OF POWER TO 02 AND H2 PURGE VALVE OPERATION WHEN FCP PURGE VALVE SWITCH S5 IS IN OPEN POSITON. DEGRADATION OF FCP OUTPUT.

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2112

FLIGHT: ABORT:

3/2R 3/2R

ITEM:

HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PCA-3 3)
- HDC AR3, AR4 4)
- 5)
- 6)
- 7)
- RCS 8)
- 05-6MA 9)

#### CRITICALITIES

41/2 4 4 41/2 2 4 41/2 4			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/2R	AOA:	3/2R
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING	3/3		

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V76A27AR3, 40V76A27AR4

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

CONTINUOUS OPEN OF O2 AND H2 PURGE VALVE OF FCP 3. POSSIBLE

DEGRADATION OF FCP OUTPUT.

DATE:

11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID:

2113

ABORT:

3/1R

ITEM: FUSE, 3 AMP FAILURE MODE: OPEN, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1, PCA-2, PCA-3 4) FUSE F1, F1, F1
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25F1, 40V76A26F1, 40V76A27F1

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

LOSS OF INPUT POWER (MAIN C) TO GPC AUTO PATH OF PURGE HDC. DEGRADATION OF FCP PERFORMANCE AND POSSIBLE LOSS OF FCP AND CREW/VEHICLE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2114

ABORT:

3/1R

ITEM:

FUSE, 3 AMP

FAILURE MODE: OPEN, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PCA-1, PCA-2, PCA-3
- FUSE F2, F2, F2 4)
- 5)
- 6)
- 7)
- 8) RCS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R <sup>°</sup>
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ]

B[NA] C[P]

LOCATION:

40V76A25F2, 40V76A25F2, 40V76A25F2

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

LOSS OF INPUT POWER (MAIN C) TO GPC AUTO PATH OF PURGE HDC. DEGRADATION OF FCP PERFORMANCE. POSSIBLE LOSS OF FCP AND CREW/VEHICLE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 3/1R SUBSYSTEM: EPD&C

ABORT: 3/1R MDAC ID: 2115

FUSES, H2 AND O2 FLOWMETER PROTECTION ITEM:

FAILURE MODE: OPEN, INADVERTANTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA 1, 2, 3
- 4) FUSE F11, F44, F6, F7, F6, F7
- 5) 6)
- 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25F7, F8, 6F6, 6F7, 7F6, 7F7

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

### EFFECTS/RATIONALE:

LOSS OF ABILITY TO MONITOR REACTANT FLOW RATES. POSSIBLE LOSS OF CREW/ VEHICLE DUE TO LOSS OF ALL ELECTRICAL POWER.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2116 ABORT: 3/1R

ITEM: DIODES, GSE AND VEHICLE ISOLATION

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA 1, 2, 3
- 4) DIODES, CR5, CR6, CR7, CR8
- 5)
- 6) 7)
- 8) RCS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25A1CR5, 6, 7, 8, (REF)

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

### EFFECTS/RATIONALE:

LOSS OF ABILITY TO DRIVE FCP PURGE VALVES DURING MANUAL PURGE VALVE OPERATION. POSSIBLE LOSS OF CREW/VEHICLE DUE TO DEGRADATION OF FCP AND LOSS OF NECESSARY ELECTRICAL POWER.

REFERENCES: ALSO DIODES 40V76A26A1CR5, 6, 7, 8, 7A1CR5, 6, 7, 8

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2117 ABORT: 3/3
ITEM: DIODES, GSE AND VEHICLE ISOLATION FAILURE MODE: SHORT, INTERNAL SHORT, (DOES NOT BLOCK)
LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER
BREAKDOWN HIERARCHY:  1) EPG 2) FUEL CELL 3) PCA 1, 2, 3 4) DIODES, CR5, CR6, CR7, CR8 5) 6) 7) 8) RCS 9) 05-6MA
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [ ] B [ ] C [ ]
LOCATION: 40V76A25A1CR5, 6, 7, 8, (REF) PART NUMBER: JANTXV1N4246
CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION
EFFECTS/RATIONALE: NONE
REFERENCES: ALSO DIODES 40V76A26A1CR5, 6, 7, 8, 7A1CR5, 6, 7, 8

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 2/1R

MDAC ID: 2118 ABORT: 2/1R

ITEM: FUSE, 3 AMP

FAILURE MODE: OPEN, INADVERTENTLY OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- 4) FUSE F6, F5, F3
- 5)
- 6)
- 7)
- 8) TCS 9) 05-6MA

#### CRITICALITIES

C1/T T T C1/T T T T T T			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25F6, 6F5, 7F3

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION

# EFFECTS/RATIONALE:

CONDUCTS INPUT POWER TO ASSOCIATED FCP CONTROL POWER CIRCUIT. LOSS OF POWER TO FC COOLANT PUMP. DEGRADATION OF FC PERFORMANCE AND POSSIBLE LOSS OF CREW/VEHICLE AFTER MULTIPLE FC FAILURE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2119 RESISTOR, 5.1K, 1/4W FAILURE MODE: ELEMENT OPENS, HI-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL
3) MID PCA 1,2,3 4) RESISTORS A1R27, A1R25, A1R26 5) 6) 7) 8) TCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A25A1R27 (REF) PART NUMBER: RLR07C512GR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK EFFECTS/RATIONALE:

REFERENCES: ALSO RESISTORS 40V76A26A1R25, 40V76A27A1R26

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2120

RESISTOR, 5.1K, 1/4W ITEM:

FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- MID PCA 1,2,3 3)
- RESISTORS A1R27, A1R25, A1R26 4)
- 5) 6)
- 7)
- TCS 8)
- 05-6MA 9)

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

40V76A25A1R27 (REF)

PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R25, 40V76A27A1R26

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 2/1R SUBSYSTEM: EPD&C ABORT: 2/1R MDAC ID: 2121

HYBRID DRIVER CONTROLLER, TYPE III, AR8, AR7, AR7 ITEM: FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTANT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) MID PCA 1,2,3
- 4) HDC AR8, AR7, AR7
- 5)
- 6) 7)
- 8) TCS
- 9) 05-6MA

### CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		
		<del>-</del>	

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25AR8, 6AR7, 7AR7

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

# EFFECTS/RATIONALE:

LOSS OF FCP VOLTAGE TO COOLANT PUMP AND H2 PUMP, RESULTING IN FCP FAILURE. POSSIBLE LOSS OF CREW/VEHICLE WITH ONE ADDITIONAL FCP FAILURE.

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HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2122 HYBRID DRIVER CONTROLLER, TYPE III, AR8, AR7, AR7 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL MID PCA 1,2,3 3) HDC AR8, AR7, AR7 4) 5) 6) 7) 8) TCS 9) 05-6MA

CRITICALITIES

CRITCALLIES			-
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25AR8, 6AR7, 7AR7

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 2/1R SUBSYSTEM: EPD&C

ABORT: 2/1R MDAC ID: 2123

DIODE, BLOCKING 3 AMP ITEM:

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3 4) DIODE CR47, 48, 47, 48, 23, 24
- 5) 6)
- 7)
- 8) TCS
- 05-6MA 9)

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25CR47, 48 (REF)

PART NUMBER: JANTXV1N5551

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

# EFFECTS/RATIONALE:

LOSS OF FCP VOLTAGE TO COOLANT PUMP AND H2 PUMP, RESULTING IN FCP FAILURE. POSSIBLE LOSS OF CREW/VEHICLE WITH ONE ADDITIONAL FCP FAILURE.

REFERENCES: ALSO DIODES 40V76A26CR47, CR48, 40V76A27CR23, CR24

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2124 ABORT: 3/3

ITEM: DIODE, BLOCKING 3 AMP FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- 4) DIODE CR47, 48, 47, 48, 23, 24
- 5) 6)
- 7)
- 8) TCS
- 9) 05-6MA

#### CRITICALITIES

	V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25CR47, 48 (REF)

PART NUMBER: JANTXV1N5551

CAUSES: THERMAL STRESS, CONTAMINATION)

EFFECTS/RATIONALE:

NONE.

REFERENCES: ALSO DIODES 40V76A26CR47, CR48, 40V76A27CR23, CR24

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2125 HYBRID DRIVER CONTROLLER, TYPE I, AR13, AR12, AR12 ITEM: FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA 1,2,3 4) HDC AR13, AR12, AR12 5) 6) 7) 8) TCS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: TAL: AOA: ATO: 3/3 3/3 PRELAUNCH: 3/3 LIFTOFF: 3/3 3/3 3/3 ONORBIT: DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A25AR13 (REF) PART NUMBER: MC477-0261-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: NONE.

REFERENCES: ALSO HDC 40V76A26AR12, 40V76A27AR12

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2126 ABORT: 3/3

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR13, AR12, AR12 FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) MID PCA 1,2,3
- 4) HDC AR13, AR12, AR12
- 5)
- 6)
- 7)
- 8) TCS
- 9) 05-6MA

CRI	TI	CALITIES
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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3	•	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25AR13 (REF)
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

NONE.

REFERENCES: ALSO HDC 40V76A26AR12, 40V76A27AR12

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3 3/3 MDAC ID: 2127 ABORT: ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR12 FAILURE MODE: ALL CREDIBLE MODES LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA-1 4) HDC AR12 5) 6) 7) 8) TCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: PRELAUNCH: 3/3 TAL: LIFTOFF: 3/3 3/3 AOA: ONORBIT: 3/3 3/3 3/3 DEORBIT: 3/3 ATO: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] ] C[ B [ LOCATION: 40V76A25AR12 PART NUMBER: MC477-0261-0002 CAUSES: STRUCTURAL FAILURE, MECHANICAL & THERMAL SHOCK, VIBRATION EFFECTS/RATIONALE: THIS ITEM NEVER RECEIVES INPUT POWER. NO FURTHER ANALYSIS REQUIRED. REFERENCES:

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

3/1R

SUBSYSTEM: EPD&C MDAC ID:

2128

FLIGHT: ABORT:

3/1R

ITEM:

HYBRID DRIVER CONTROLLER, TYPE I, AR11, AR11

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN,

SHORT TO GROUND

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- MID PCA-2,3 3)
- HDC AR11, AR11 4)
- 5)
- 6)
- 7)
- TCS 8)
- 05-6MA 9)

#### CRITICALITIES

	45/4 4 4 40		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	. 3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	3/3		

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C[P]

LOCATION:

40V76A26AR11, 7AR11

PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF ABILITY TO INHIBIT START-UP HTR. FCP OVERHEATS. FCP

DEGRADATION AND POSSIBLE FCP LOSS.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C MDAC ID: 2129 ABORT: 3/3 HYBRID DRIVER CONTROLLER, TYPE I, AR11, AR11 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA-2,3 4) HDC AR11, AR11 5) 6) 7) 8) TCS 9) 05-6MA CRITICALITIES ### CRITICALITIES

HDW/FUNC ABORT HDW/FUNC

3/3 RTLS: 3/3

3/3 TAL: 3/3

3/3 AOA: 3/3 FLIGHT PHASE PRELAUNCH: 3/3 LIFTOFF: ONORBIT: ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A26AR11, 7ARII PART NUMBER: MC477-0261-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: NONE. REFERENCES:

HDW/FUNC HIGHEST CRITICALITY 11/25/86 DATE: 3/3 SUBSYSTEM: EPD&C FLIGHT:

3/3 ABORT: MDAC ID: 2130

RESISTOR 1.2 KOHM, 2W ITEM: FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- MID PCA 1,2,3 3)
- RESISTOR AIR13, 13, 14 4)
- 5)
- 6) 7)
- 8) TCS
- 05-6MA 9)

### CRITICALITIES

	V21===		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFI	NG: 3/3		-

B[] C[] REDUNDANCY SCREENS: A [ ]

LOCATION: 40V76A25A1R13 (REF)

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R13, 7A1R13

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: SUBSYSTEM: EPD&C 3/3 FLIGHT: ABORT: 3/3 MDAC ID: 2131 RESISTOR 1.2 KOHM, 2W ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) MID PCA 1,2,3 4) RESISTOR AIR13, 13, 14 5) 6) 7) 8) TCS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 PRELAUNCH: 3/3 RTLS: 3/3 TAL: 3/3 LIFTOFF: 3/3 AOA: ONORBIT: 3/3 3/3 DEORBIT: ATO: 3/3

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V7

40V76A25A1R13 (REF)

PART NUMBER: RWR80S1211FR

LANDING/SAFING: 3/3

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R13, 7A1R13

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2132

ABORT:

3/3

ITEM:

SWITCH, FUEL CELL H20 LINE HTR

FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO

CONDUCT

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) SWITCH S9
- 5)
- 6)
- 7)
- WRS 8)
- 05-6MA 9)

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 1 ]

B[P] C[P]

LOCATION:

32V73A12A1S9

PART NUMBER: ME452-0102-7206

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

### EFFECTS/RATIONALE:

FUNCTION: WHEN IN AUTO (A) POSITION, PRIMARY HEATER ELEMENTS IN FC 1,2 & 3 ARE ACTIVATED. WHEN IN AUTO (B) POSITION, SECONDARY HTR ELEMENTS ARE ACTIVATED.

EFFECTS: ENERGIZES HEATER ELEMENTS OF FC H2O LINE HTR FOR EACH HTRS USED ONLY DURING STARTUP OF FCP. CAPABILITY TO START A SHUTDOWN FC DURING FLIGHT HAS NOT BEEN DEMONSTRATED, HOWEVER THE CAPABILITY DOES EXIST.

SUBSY	STEM: ID:	EPD&C			I	HIGHE	ST_CI	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: FAILU	RE MOD	SWITCH E: SHORTS	, FUI	EL CELI ADVERTI	L H2O ENTLY	LINE	HTR ES		
LEAD	ANALYS	r: J. PATT	ON	st	JBSYS	LEAD	: K.	SCHMECKPER	'ER
1) 2) 3)		2A1							
8)									
9)	05-6MA								
				CRITI	CALTI	TES			
F	PRELA LIFTO ONORE DEORE	PHASE AUNCH: DFF: BIT: BIT: ING/SAFING	3/ 3/ 3/	FUNC '3 '3 '3 '3		ABO	RT	HDW/FUN 3/3 3/3 3/3 3/3	'C
REDUN	IDANCY S	CREENS:	A [	]	В		]	c [ ]	
LOCAT	ION:	32V73A1	2A1S9	)					
PART	NUMBER:	ME452-0	102-7	206		44 × 4			
CAUSE	s: con	TAMINATIO							
FUNCT FC 1, HTR E	2 & 3 1	HEN IN AUT ARE ACTIVA S ARE ACTI	O (A)	WHEN	ION, IN AU	PRIMA JTO (1	ARY H B) PO	EATER ELEM SITION, SE	ENTS IN CONDARY
	RENCES:	1 1 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 - E	출원 (1.1.) 		12112.12.2.			

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

3/1R FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2134

FUSE, 1 AMP ITEM:

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- EPG 1)
- 2) FUEL CELL
- PNL R12A1 3)
- 4) FUSE F1
- 5)
- 6) 7)
- 8)
- WRS 91 05-6MA

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/1R	TAL:	3/3
3/1R	AOA:	3/3
3/1R	ATO:	3/3
3/3		·
	3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1F1 PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H20 LINE HTR SWITCH (S9) AND THE CORRESPONDING PRIMARY FC H2O LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H20 LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL OPERATIONS AS TEMPERATURE OF PRODUCT H20 PREVENTS FREEZING.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2135 ABORT: 3/3

ITEM: FUSE, 7.5 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) FUSE F52
- 5)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

	~		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25F52

PART NUMBER: ME451-0018-07500

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL ABBRASAM OF CAREE d

# EFFECTS/RATIONALE:

FUNCTION: CONDUCTS POWER FROM MN BUS A AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND THE CORRESPONDING PRIMARY FCI H20 LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF PRIMARY HTR ELEMENTS. NO EFFECT UNLESS A SHUTDOWN FCP HAS TO RESTARTED DURING FLIGHT. THIS CAPABILITY HAS NEVER BEEN DEMONSTRATED, HOWEVER THE PROCEDURE EXISTS.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

3/1R SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: MDAC ID: 2136

ITEM: FUSE , 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PCA-1
- FUSE F5 4)
- 5)
- 6)
- 7) 8)
- WRS 9) 05-6MA

#### CRITICALITIES

	A1/2 T T A1/		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V76A25F5

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND THE PRIMARY FC1 H20 LINE HTR (AUTO A PATH). EFFECTS: LOSS OF PRIMARY HTR ELEMENTS. NO EFFECT UNLESS A SHUTDOWN FCP HAS TO RESTARTED DURING FLIGHT. THIS CAPABILITY HAS NEVER BEEN DEMONSTRATED, HOWEVER THE PROCEDURE EXISTS.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 3/1R SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2137

ITEM: HYBRID DRIVER CONTROLLER TYPE III, AR7
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PCA-1 3)
- 4) HDC AR7
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

	V		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25AR7 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC1 H20 LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF PRIMARY HTR ELEMENTS. NO EFFECT UNLESS A

SHUTDOWN FCP HAS TO RESTARTED DURING FLIGHT. THIS CAPABILITY HAS

NEVER BEEN DEMONSTRATED, HOWEVER THE PROCEDURE EXISTS.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 ABORT: MDAC ID: 2138 HYBRID DRIVER CONTROLLER TYPE III, AR7 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PCA-1 3) 4) HDC AR7

5) 6) 7) 8) WRS 9) 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25AR7
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF PWR TO PRIMARY FC1 H20 LINE

HTR (AUTO A PATH).

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 2/1R SUBSYSTEM: EPD&C 3/3 2139 ABORT: MDAC ID:

ITEM: FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1 4) FUSE F11
- 5)
- 6)
- 7)
- 8) WRS 9) 05-6MA

### CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	2/1R	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A25F11 PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND THE SECONDARY FC1 H20 LINE HTR (AUTO B PATH). EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. ONLY USED IN THE EVENT THAT A FCP MUST BE STARTED PREFLIGHT OR RESTARTED DURING THE MISSION. THIS CAPABILITY HAS NOT BEEN DEMONSTRATED, BUT DOES EXIST.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID:

2140

ABORT:

3/3

ITEM:

HYBRID DRIVER CONTROLLER TYPER III AR14

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- HDC AR14 4)
- 5)
- 6)
- 7)
- 8) WRS
- 05-6MA 9)

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	2/1R	ATO:	3/3
LANDING/SAFING			•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C. [ P ]

LOCATION:

40V76A25AR14

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

### EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC1 H2O

LINE HTR (AUTO B PATH).

EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. ONLY USED IN THE EVENT THAT A FCP MUST BE STARTED PREFLIGHT OR RESTARTED DURING THE MISSION. THIS CAPABILITY HAS NOT BEEN DEMONSTRATED,

BUT DOES EXIST.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: 3/3 2141 ABORT: MDAC ID: HYBRID DRIVER CONTROLLER TYPER III AR14 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-1 4) HDC AR14 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT
3/3 RTLS:
3/3 TAL: HDW/FUNC FLIGHT PHASE 3/3 PRELAUNCH: LIFTOFF: 3/3 AOA: ATO: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ . ] C [ ] LOCATION: 40V76A25AR14 PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC1 H20 LINE HTR (AUTO B PATH). EFFECTS: NONE. REFERENCES:

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: MDAC ID: 2142 ABORT:

FLIGHT: 3/1R ABORT: 3/3

ITEM: FU

FUSE, 1 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) FUSE F2
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

	V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A12A1F2
PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H20 LINE HTR SWITCH (S9) AND THE CORRESPONDING PRIMARY FC

H2O LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H2O LINE. ONLY NEEDED IN
THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL
OPERATIONS AS TEMPERATURE OF H2O PREVENTS FREEZING.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID:

2143

ABORT:

3/3

ITEM:

FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- FUSE F14 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		-

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A26F14

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION

FOR THE HDC AND PRIMARY FC2 H20 LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H20 LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL OPERATIONS AS TEMPERATURE OF H20 PREVENTS FREEZING.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2144

FLIGHT: 3/1R ABORT: 3/3

HYBRID DRIVER CONTROLLER TYPE III AR14

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) HDC AR14
- 5)

ITEM:

- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/1R	TAL:	3/3
3/1R	AOA:	3/3
3/1R	ATO:	3/3
3/3		•
	3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A26AR14 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC2 H20

LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H20 LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL

OPERATIONS AS TEMPERATURE OF H20 PREVENTS FREEZING.

	SYSTEM:	11/25/86 EPD&C 2145	;	an cantal with	HIGH	HEST CF	RITICALITY FLIGHT: ABORT:	HDW/FUNG 3/3 3/3
FAII		HYBRII E: INADVI						ONDUCTS
LEAD	ANALYS'	r: J. PATI	ON	SUBS	YS LEA	D: K.	SCHMECKPE	PER
1) 2) 3) 4) 5) 6) 7)	KDOWN HEPG FUEL CI PCA-2 HDC ARE	14						
-,								
				CRITICA	LITIES	-		
	FLIGHT DEFINITION OF THE PRESENT OF	PHASE AUNCH: DFF: BIT: BIT: ING/SAFING	HDW/F 3/3 3/3 3/3 3/3 3: 3/3	UNC	AE	RTLS: TAL: AOA: ATO:	3/3 3/3 3/3	
REDU	NDANCY S	SCREENS:	A [	]	B [	]	c [ ]	
PART CAUS	NUMBER:	40V76A2 : MC477-0 ERMAL STRE CTURAL FAI	263-00 ss, VI	02	, CONT		TION, MECH	ANICAL
FUNC LINE EFFE	TION: PI	IONALE: ROVIDES RE UTO A PATE NE.	MOTE C	ONTROL	OF POW	VER TO	PRIMARY F	C2 H2O
REFE	RENCES:							

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID:

2146

ABORT:

3/3

ITEM:

FUSE, 3 AMP FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- EPG
- 2) FUEL CELL
- PCA-2 3)
- FUSE F13 4)
- 5)
- 6)
- 7)
- WRS 8)
- 05-6MA 9)

### CRITICALITIES

~			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	3/3
ONORBIT:	2/1R	AOA:	. 3/3
DEORBIT:	2/1R	ATO:	3/3
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

40V76A26F13

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR HDC AND SECONDARY FC2 H2O LINE HTR (AUTO B PATH).

EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. HTRS ONLY USED WHEN STARTING A FCP DURING PREFLIGHT OR WHEN RESTARTING A FCP DURING THE MISSION. THIS CAPABILITY EXISTS, BUT HAS NOT BEEN DEMONSTRATED.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID: 2147

ABORT:

3/3

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR13
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PCA-2
- 4) HDC AR13
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	2/1R	ATO:	3/3
LANDING/SAFING:	3/3		
	2.02		

REDUNDANCÝ SCREENS: A [ 3 ] B [NA ] C [ P ]

LOCATION: 40V76A26AR13

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC2 H20

LINE HTR (AUTO B PATH).

EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. HTRS ONLY USED WHEN STARTING A FCP DURING PREFLIGHT OR WHEN RESTARTING A FCP DURING THE MISSION. THIS CAPABILITY EXISTS, BUT HAS NOT BEEN DEMONSTRATED.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2148 ABORT: 3/3

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR13

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) HDC AR13
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

# CRITICALITIES

C1/111 C101111110			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		-

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A26AR13
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC2 H2O

LINE HTR (AUTO B PATH).

EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2149 ABORT: 3/3

MDAC ID: 2149 ABORI:

ITEM: FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-3
- 4) FUSE F8
- 5)
- 6)
- 7)
- 8) WRS 9) 05-6MA

# CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3	-	•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V75A27F8

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCT POWER AND PROVIDE CIRCUIT PROTECTION TO THE HDC AND PRIMARY FC3 H20 LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF PRIMARY HEATER ELEMENTS. HTRS USED ONLY DURING FCP STARTUP PREFLIGHT AND DURING FCP RESTART DURING A MISSION.

THE ON-ORBIT CAPABILITY TO RESTART A FCP HAS NOT BEEN DEMONSTRATED; HOWEVER, PROCEDURES EXIST TO RESTART A SHUTDOWN FCP.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2150

FLIGHT:

3/1R

ABORT:

3/3

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR24

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PCA-3 3)
- HDC AR24 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING	•		-

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

40V75A27AR24 LOCATION:

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC3 H2O

LINE HTR (AUTO A PATH).

EFFECTS: LOSS OF PRIMARY HEATER ELEMENTS. HTRS USED ONLY DURING FCP STARTUP PREFLIGHT AND DURING FCP RESTART DURING A MISSION. THE ON-ORBIT CAPABILITY TO RESTART A FCP HAS NOT BEEN

DEMONSTRATED; HOWEVER, PROCEDURES EXIST TO RESTART A SHUTDOWN

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2151 ITEM: HYBRID DRIVER CONTROLLER TYPE III AR24 FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PCA-3 3) 4) HDC AR24 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 RTLS: 3/3 PRELAUNCH: LIFTOFF: 3/3 3/3 TAL: 3/3 ONORBIT: AOA: 3/3 ATO: DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V75A27AR24 gareave e compo PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC3 H2O LINE HTR (AUTO A PATH). EFFECTS: NONE. Land the control of t A THE STATE OF THE REFERENCES:

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 MDAC ID: 2152 ABORT:

FUSE, 7.5 AMP ITEM:

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- EPG
- 2) FUEL CELL
- 3) PCA-3
- FUSE F13 4)
- 5) 6)
- 7)
- 8) WRS
- 9) 05-6MA

# CRITICALITIES

	~*************************************			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

40V75A27F13

PART NUMBER: ME451-0018-07500

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:

FUNCTION: CONDUCT MAIN BUS POWER AND PROVIDE CIRCUIT PROTECTION

TO THE HDC AND SECONDARY FC3 H2O LINE HTR (AUTO B PATH).

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 2/1R SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2153

FUSE, 3 AMP ITEM:

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PCA-3 3)
- 4) FUSE F5
- 5)
- 6)
- 7)
- 8) WRS
- 05-6MA 9)

### CRITICALITIES

	7112 - 7122 - 723			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	2/1R	TAL:	3/3	
ONORBIT:	2/1R	AOA:	3/3	
DEORBIT:	2/1R	ATO:	3/3	
LANDING/SAFING:	3/3		·	

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V75A27F5

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCT POWER AND PROVIDE CIRCUIT PROTECTION TO THE HDC AND SECONDARY FC3 H20 LINE HTR (AUTO B PATH).

EFFECTS: LOSS OF POWER TO SECONDARY HEATER ELEMENTS. HTRS USED ONLY DURING PREFLIGHT STARTUP OF FCP AND FOR THE RESTART OF A SHUTDOWN FCP DURING A MISSION. THE CAPABILITY TO RESTART A SHUTDOWN FCP HAS NOT BEEN DEMONSTRATED.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID:

2154

ABORT:

3/3

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR5

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PCA-3 3)
- 4) HDC AR5
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
2/1R	TAL:	3/3
2/1R	AOA:	3/3
2/1R	ATO:	3/3
3/3		
	3/3 2/1R 2/1R 2/1R 2/1R	3/3 RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

40V75A27AR5

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

### EFFECTS/RATIONALE:

FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC3 H2O

LINE HTR (AUTO B PATH).

EFFECTS: LOSS OF POWER TO SECONDARY HEATER ELEMENTS. HTRS USED ONLY DURING PREFLIGHT STARTUP OF FCP AND FOR THE RESTART OF A SHUTDOWN FCP DURING A MISSION. THE CAPABILITY TO RESTART A SHUTDOWN FCP HAS NOT BEEN DEMONSTRATED.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2155 HYBRID DRIVER CONTROLLER TYPE III AR5 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-3 4) HDC AR5 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES

FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3 CRITICALITIES LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V75A27AR5 PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC3 H20

REFERENCES:

EFFECTS: NONE.

LINE HTR (AUTO B PATH).

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

FLIGHT: 3/1R SUBSYSTEM: EPD&C 3/1R ABORT: MDAC ID: 2156

FUSE, 1 AMP ITEM:

FAILURE MODE: OPEN - INADVERTENTLY OPENS

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

# BREAKDOWN HIERARCHY:

- EPG 1)
- 2) FUEL CELL
- 3) PNL R12A1
- FUSE F3 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B[P] C[P]

LOCATION: 32V73A12A1F3 PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

#### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H2O RELIEF HTR SWITCH S10 (AUTO A PATH).

EFFECTS: LOSS OF PRIMARY HEATER ELEMENTS OF THE THREE H2O RELIEF VALVE HTRS, VENT LINE, BARREL AND WATER NOZZLE HEATERS.

REDUNDANCY IN STANDBY HEATERS.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID:

2157

ABORT:

2/1R

ITEM:

FUSE, 1 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PNL R12A1 3)
- 4) FUSE F4
- 5)

6)

7)

8) WRS

05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 32V73A12A1F4

PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H2O RELIEF HTR SWITCH S10 (AUTO B PATH).

EFFECTS: LOSS OF STANDBY HEATER ELEMENTS OF THE THREE H2O RELIEF VALVE HTRS, VENT LINE, BARREL AND WATER NOZZLE HTRS. LOSS OF FC AND CREW/VEHICLE DUE TO FLOODING OF FC BY EXCESS H2O.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID:

2158

ABORT:

2/1R

ITEM:

SWITCH, FUEL CELL H20 RELIEF HEATER

FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO

CONDUCT

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PNL R12A1 3)
- SWITCH S10 4)
- 5)
- 6)
- 7)
- WRS 8)
- 05-6MA 9)

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING	•		•

REDUNDANCY SCREENS: A [ 1 ]

B[P] C[P]

LOCATION:

32V73A12A1S10

PART NUMBER: ME452-0102-7206

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE: FUNCTION: IN AUTO (A) POSITION, ENERGIZES THE PRIMARY HTR ELEMENT OF H2O RELIEF VALVES, H2O VENT LINE, AND H2O BARREL HTR ASSY. IN

AUTO (B) POSITION, ENERGIZES THE SECONDARY HTR ELEMENTS.

EFFECTS: SECONDARY HEATER ELEMENTS AVAILABLE OR EXCESS H2O CAN BE

ROUTED TO H20 SUPPLY STORAGE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 2159 ABORT: 3/3 MDAC ID: ITEM: SWITCH, FUEL CELL H2O RELIEF HEATER FAILURE MODE: SHORTS, INADVERTENTLY CLOSES LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R12A1 4) SWITCH S10 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: TAL: AOA: PRELAUNCH: 3/3 3/3 3/3 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 32V73A12A1S10 PART NUMBER: ME452-0102-7206 CAUSES: CONTAMINATION, SHOCK, VIBRATION EFFECTS/RATIONALE: FUNCTION: IN AUTO (A) POSITION, ENERGIZES THE PRIMARY HTR ELEMENT OF H2O RELIEF VALVES, H2O VENT LINE, AND H2O BARREL HTR ASSY. IN AUTO (B) POSITION, ENERGIZES THE SECONDARY HTR ELEMENTS. EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

3/1R FLIGHT: SUBSYSTEM: EPD&C 3/1R ABORT: MDAC ID: 2160

DIODE, 1 AMP BLOCKING ITEM:

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- EPG 1)
- 2) FUEL CELL
- PNL R12A1 3)
- DIODE A9CR2, A10CR1, A10CR2 4)

5)

6) 7)

- 8)
- WRS 05-6MA 9)

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

32V73A12A1A9CR2, 32V73A12A1A10CR1, 32V73A12A1A10CR2 LOCATION:

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

### EFFECTS/RATIONALE:

FUNCTION: PROVIDES CONTROL TO HTR CIRCUITRY BY CONTROLLING COMMANDS FROM FC H20 RELIEF HTR SWITCH S10 TO RESPECTIVE HTR ELEMENTS. FUNCTION IS DEPENDENT ON S10 POSITION AUTO (A) OR AUTO (B).

EFFECTS: LOSS OF FUNCTION RESULTS IN HTR ELEMENT MALFUNCTION IN EITHER AUTO (A) OR AUTO (B) POSITION. SWITCHING TO ALTERNATE POSITION CORRECTS FAILURE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2161 DIODE, 1 AMP BLOCKING ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PNL R12A1 DIODE A9CR2, A10CR1, A10CR2 4) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: TAL: AOA: 3/3 3/3 PRELAUNCH: 3/3 3/3 3/3 LIFTOFF: ONORBIT: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 32V73A12A1A9CR2, 32V73A12A1A10CR1, 32V73A12A1A10CR2 PART NUMBER: JANTXV1N4246 CAUSES: THERMAL STRESS, CONTAMINATION EFFECTS/RATIONALE: FUNCTION: PROVIDES CONTROL TO HTR CIRCUITRY BY CONTROLLING

COMMANDS FROM FC H20 RELIEF HTR SWITCH S10 TO RESPECTIVE HTR ELEMENTS. FUNCTION IS DEPENDENT ON S10 POSITION AUTO (A) OR AUTO

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REFERENCES:

EFFECTS: NONE.

(B).

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2162 ABORT: 3/3

ITEM: RESISTORS, 5.1 K OHM, 1/4 W

FAILURE MODE: OPEN, SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PNL R12A1
- 4) RESISTORS A9R1, A9R2, A10R1, A10R2
- 5)
- 6) 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

	7.1.		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 32V73A12A1A9R1, 32V73A12A1A9R2, 32V73A12A1A10R1,

32V73A12A1A10R2

PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:

FUNCTION: PROVIDE CURRENT ISOLATION BETWEEN FC H20 LINE HTR SWITCH (S9) AND MDM OF4, AND BETWEEN FC H20 RELIEF HTR SWITCH

(S10) AND MDM OF4.

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: 2163 MDAC ID: RESISTORS, 5.1 K OHM, 1/4 W ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PNL R12A1 4) RESISTORS A9R1, A9R2, A10R1, A10R2 5) 6) 7) 8) WRS 05-6MA 9) CRITICALITIES HDW/FUNC ABORT FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 3/3 AOA: 3/3 ONORBIT: ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] 32V73A12A1A9R1, 32V73A12A1A9R2, 32V73A12A1A10R1, LOCATION: 32V73A12A1A10R2 PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

== :

SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDE CURRENT ISOLATION BETWEEN FC H20 LINE HTR SWITCH (S9) AND MDM OF4, AND BETWEEN FC H20 RELIEF HTR SWITCH (S10) ANDD MDM OF4.

EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2164 ABORT: 3/1R

ITEM: DIODE, 1 AMP ISOLATION

FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) DIODES AlCR50, AlCR51, AlCR52, AlCR53
- 5) 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A26A1CR50, 40V76A26A1CR51, 40V76A26A1CR52,

40V76A26A1CR53

PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

# EFFECTS/RATIONALE:

FUNCTION: PROVIDES CIRCUIT ISOLATION BETWEEN COMMANDS CONTROLLING HDC'S AR5 AND AR36 WHICH PROVIDE POWER TO STDBY NOZZLE HTR. EFFECTS: LOSS OF STDBY NOZZLE HTR. NO EFFECT UNLESS FAILURE OF H2O STORAGE AND H2O NOZZLE FREEZES. THEN LOSS OF FC BY FLOODING WITH EXCESS H2O.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2165 DIODE, 1 AMP ISOLATION ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PCA-2 3) DIODES AlCR50, AlCR51, AlCR52, AlCR53 4) 5) 6) 7) 8) WRS 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 3/3 RTLS: PRELAUNCH: 3/3 LIFTOFF: 3/3 TAL: ONORBIT: 3/3 AOA: 3/3 ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] \*\* 40V76A26A1CR50, 40V76A26A1CR51, 40V76A26A1CR52, LOCATION: 40V76A26A1CR5 PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CIRCUIT ISOLATION BETWEEN COMMANDS CONTROLLING

HDC'S AR5 AN AR36 WHICH PROVIDE POWER TO STDBY NOZZLE HTR.

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2166 DIODE, 1 AMP ISOLATION ITEM: FAILURE MODE: OPEN LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: EPG 2) FUEL CELL PCA-1 & 2 3) DIODES A1CR52, A1CR53, A1CR55 4) 5) 6) 7) 8) WRS 05-6MA 9) CRITICALITIES FLIGHT PHASE HDW/FUNC

 OW/FUNC
 ABORT
 HDW/FUNC

 3/3
 RTLS:
 3/3

 3/3
 TAL:
 3/3

 3/3
 AOA:
 3/3

LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25A1CR52, 40V76A25A1CR53, 40V76A26A1CR55

PART NUMBER: JANTXV1N4246

PRELAUNCH:

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

FUNCTION: CONDUCTS MDM INPUT AND PROVIDES CIRCUIT ISOLATION

BETWEEN MDM OF2 AND NOZZLE HTR TEMP CONTROLLERS.

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 SUBSYSTEM: EPD&C FLIGHT: ABORT: 3/3 2167 MDAC ID: DIODE, 1 AMP ISOLATION ITEM: FAILURE MODE: SHORT (DOES NOT BLOCK) LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-1 & 2 4) DIODES AlCR52, AlCR53, AlCR55 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 PRELAUNCH: 3/3 3/3 TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 B[] C[] REDUNDANCY SCREENS: A [ ] 40V76A25A1CR52, 40V76A25A1CR53, 40V76A26A1CR55 LOCATION: PART NUMBER: JANTXV1N4246 CAUSES: THERMAL STRESS, CONTAMINATION EFFECTS/RATIONALE: FUNCTION: CONDUCTS MDM INPUT AND PROVIDES CIRCUIT ISOLATION BETWEEN MDM OF2 AND NOZZLE HTR TEMP CONTROLLERS. EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2168 ABORT: 3/3

ITEM: RESISTOR, 5.1K

FAILURE MODE: ELEMENT OPEN, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1 & 2
- 4) RESISTOR A1R29, A1R30, A1R29
- 5)
- 6) 7)
- 8) WRS
- 9) 05-6MA

# CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		•
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25A1R29, 40V76A25A1R30, 40V76A26A1R29

PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FUNCTION: PROVIDES CURRENT ISOLATION AND LIMITING BETWEEN H2O

NOZZLE HTR TEMPERATURE CONTROLLERS AND MDM'S.

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 2169 ABORT: MDAC ID: RESISTOR, 5.1K ITEM: FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-1 & 2 RESISTORS A1R29, A1R30, A1R29 6) 7) 8) WRS 9) 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: RTLS: 3/3 3/3 3/3 3/3.... LIFTOFF: TAL: ONORBIT: 3/3 AOA: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ 40V76A25A1R29 40V76A25A1R30 40V76A26A1R29 LOCATION: PART NUMBER: RLR07C512GR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK EFFECTS/RATIONALE: FUNCTION: PROVIDES CURRENT ISOLATION AND LIMITING BETWEEN H2O NOZZLE HTR TEMPERATURE. CONTROLLERS AND MDM'S. EFFECTS: NONE.

REFERENCES:

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE:

FLIGHT: 3/1R SUBSYSTEM: EPD&C ABORT: 3/1R 2170 MDAC ID:

FUSE, 3 AMP ITEM:

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- EPG 1)
- FUEL CELL 2)
- PCA-1 3)
- FUSE F3 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

LOCATION:

40V76A25F3

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

# EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR5 AND PRIMARY HTR ELEMENT OF H20 RELIEF VLV #1 HTR. EFFECTS: LOSS OF PRIMARY H20 RELIEF VALVE #1 HTR. REDUNDANCY IN STANDBY HTR'S.

DATE: 11/25/86 HIGHEST CRITICALITY

HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2171

ABORT:

3/1R

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR5

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- HDC AR5 4)
- 5)
- 6)
- 7)
- 8) WRS
- 05-6MA

#### CRITICALITIES

			·	
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
ONORBIT:	3/1R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING:	3/3		•	

REDUNDANCY SCREENS:

A [ 1 ]

B [ P ]

C [ P ]

LOCATION: 40V76A25AR5

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR. REDUNDANCY IN SECONDARY HTR ELEMENTS SO MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF VEHICLE/CREW.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2172 ABORT: 3/3

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) HDC AR5
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25AR5
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: NONE.

DATE:

11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2173

FLIGHT: 2/1R ABORT:

organization of the third of the second

2/1R

ITEM:

FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) FUSE F44
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	2/1R
2/1R	TAL:	2/1R
2/1R	AOA:	2/1R
2/1R	ATO:	2/1R
3/3		•
	3/3 2/1R 2/1R 2/1R	3/3 RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A25F44

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR44 AND SECONDARY HTR ELEMENT OF H20 RELIEF VALVE #1

EFFECTS: LOSS OF SECONDARY H20 RELIEF VALVE #1 HTR. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS H2O.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2174 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR44

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTANTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1
- 4) HDC AR44
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC	
3/3	RTLS:	2/1R	
2/1R	TAL:	2/1R	
2/1R	AOA:	2/1R	
2/1R	ATO:	2/1R	
3/3		·	
	HDW/FUNC 3/3 2/1R 2/1R 2/1R	3/3 RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO:	

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A25AR44
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.

POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS H2O.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: MDAC ID: 2175 HYBRID DRIVER CONTROLLER TYPE III AR44 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-1 4) HDC AR44 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: TAL: AOA: 3/3 PRELAUNCH: 3/3 3/3 3/3 3/3 LIFTOFF: ONORBIT: 3/3 3/3 ATO: DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A25AR44 PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H20 RELIEF HTR. EFFECTS: NONE. Provided Company of the Company of t REFERENCES:

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2176 ABORT: 3/1R

ITEM: FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) FUSE F10
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A26F10
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

# EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR39 AND PRIMARY HTR ELEMENTS OF H20 RELIEF VALVE #2

EFFECTS: LOSS OF PRIMARY H20 RELIEF VALVE #2 HTR. REDUNDANCY IN SECONDARY HTR'S.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID:

2177

ABORT:

797124

3/1R

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR39
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PCA-2
- 4) HDC AR39
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

# CRITICALITIES

	~~~~~~		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		<u>.</u>

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A26AR39 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR VALVE

IN FC NO 2. REDUNDANCY IN SECONDARY HTR AND MULTIPLE FC'S SO

MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF

VEHICLE/CREW.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT:

MDAC ID: 2178

HYBRID DRIVER CONTROLLER TYPE III AR39 ITEM:

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PCA-2
- HDC AR39 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

# CRITICALITIES

01/11/01/11/11			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A26AR39 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2179

FLIGHT: ABORT:

2/1R 2/1R

ITEM:

FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- PCA-2 3)
- FUSE F8 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	PRELAUNCH: 3/3 LIFTOFF: 2/1R ONORBIT: 2/1R DEORBIT: 2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
TAMBÉNO (CARTNO.			•

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

40V76A26F8

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

### EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR40 AND SEECONDARY HTR ELEMENT OF H20 RELIEF VALVE #2 HTR.

EFFECTS: LOSS OF SECONDARY H20 RELIEF VALVE #2 HTR. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS H2O.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2180 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR40

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) HDC AR40
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A26AR40 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

# EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.

EFFECTS: LOSS OF SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR VALVE IN FC NO 2. POSSIBLE LOSS OF FC DUE TO FLOODING BY EXCESS H2O.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2181 HYBRID DRIVER CONTROLLER TYPE III AR40 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL PCA-2 3) HDC AR40 4) 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 PRELAUNCH: 3/3 RTLS: 3/3 3/3 TAL: LIFTOFF: AOA: 3/3 ONORBIT: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A26AR40 PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H20 RELIEF HTR. EFFECTS: NONE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2182 ABORT: 3/1R

ITEM: FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) FUSE F10
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

	V-12 V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A27F10
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR25 AND PRIMARY HTR ELEMENT OF H20 RELIEF VALVE #3

EFFECTS: LOSS OF PRIMARY H20 RELIEF VALVE #3 HTR. REDUNDANCY IN SECONDARY HTR'S.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID:

2183

ABORT:

3/1R

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR25

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
  3) PCA-3
- 4) HDC AR25
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

# CRITICALITIES =

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A27AR25

PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF PRIMARY HTR ELEMENTS OF THE H20 RELIEF HTR FOR

FC NO 3. REDUNDANCY IN SECONDARY HTR ELEMENTS SO MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2184 HYBRID DRIVER CONTROLLER TYPE III AR25 ITEM: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS FAILURE MODE: PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL 3) PCA-3 HDC AR25 4) 5) 6) 7) 8) WRS 05-6MA CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 3/3 PRELAUNCH: RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 AOA: ONORBIT: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A27AR25 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: NONE.

11/25/86 HIGHEST CRITICALITY HDW/FUNC DATE:

FLIGHT: 2/1R SUBSYSTEM: EPD&C 2185 MDAC ID:

2/1R ABORT:

FUSE, 3 AMP ITEM:

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-3
- 4) FUSE F4
- 5) 6)
- 7)
- 8) WRS
- 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A27F4

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

# EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR6 AND SECONDARY HTR ELEMENT OF H2O RELIEF VALVE #3

EFFECTS: LOSS OF SECONDARY H20 RELIEF VALVE #3 HTR. POSSIBLE

LOSS OF FC BY FLOODING OF FC BY EXCESS PRODUCT H2O.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE:

FLIGHT: 2/1R SUBSYSTEM: EPD&C 2/1R ABORT: 2186 MDAC ID:

HYBRID DRIVER CONTROLLER TYPE III AR6 ITEM:

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-3
- 4) HDC AR6
- 5)
- 6)
- 7)
- 8) WRS
- 05-6MA 9)

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A27AR6 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

## EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR FOR FC NO 3. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS PRODUCT

H20.

11/25/86 HIGHEST CRITICALITY HDW/FUNC DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C ABORT: 3/3 2187 MDAC ID: HYBRID DRIVER CONTROLLER TYPE III AR6 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) FUEL CELL
3) PCA-3 4) HDC AR6 5) 6) 7) 8) WRS 9) 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 RTLS: 3/3 TAL: 3/3 PRELAUNCH: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A27AR6 PART NUMBER: MC477-0263-0002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H20 RELIEF HTR. EFFECTS: NONE. REFERENCES:

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2188 ABORT: 3/1R

ITEM: FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1, PCA-2
- 4) FUSE F4, F4
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/1R
3/1R	TAL:	3/1R
3/1R	AOA:	3/1R
3/1R	ATO:	3/1R
: 3/3		
	3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 40V76A25F4, 40V76A26F4

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR6 AND PRIMARY AND SECONDARY H20 RELIEF HTR. EFFECTS: LOSS OF RELIEF VALVE HTR CAPABILITY IN EITHER THE PRIMARY OR SECONDARY MODE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R ABORT: 3/1R

MDAC ID: 2189

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND 

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PCA-1 4) HDC AR6

- 5)
- 6)
- 7)
- 8) WRS 9) 05-6MA

CRI	mT	77	TT	mT	<b>TO</b>
$\mathbf{C}\mathbf{K}\mathbf{I}$	11		44	TT	E3

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	•		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A25AR6 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF PRIMARY H20 RELIEF VLV HTR ELEMENT. REDUNDANCY IN SECONDARY HTRS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL POWER NEEDED TO HEAT VENT VLV.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: SUBSYSTEM: EPD&C FLIGHT: 3/3 3/3 ABORT: MDAC ID: 2190

HYBRID DEVICE CONTROLLER TYPE III AR6 ITEM:

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PCA-1
- HDC AR6 4)
- 5)
- 6)
- 7)
- WRS 8)
- 05-6MA

CRITICALITIES

41/4 4 4 41 11 1 1 1 1			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A25AR6 PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: NONE.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86

SUBSYSTEM: EPD&C FLIGHT: 2/1R 2/1R MDAC ID: 2191 ABORT:

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTANTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL 3) PCA-2
- HDC AR6 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A26AR6 PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR

ELEMENTS OF THE H20 RELIEF HTR.

EFFECTS: LOSS OF SECONDARY H20 RELIEF VLV HTR ELEMENTS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL POWER NEEDED TO HEAT VENT VLV, AND LOSS OF FC BY EXCESS PRODUCT H20 FLOODING.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

MDAC ID: 2192 ABORT: 3/3

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) HDC AR6
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V76A26AR6
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR

ELEMENTS OF THE H2O RELIEF HTR.

EFFECTS: NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R ABORT: 3/1R

MDAC ID: 2193

ITEM:

FUSE, 1 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) PCA-1, PCA-2
- 4) FUSE F42, F12
- 5)
- 6)
- 7)
- WRS 8)
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V76A25F42, 40V76A26F12

PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR HDC'S 37 AND PRIMARY AND SECONDARY HTR ELEMENTS OF FC 1,2,3 BARREL HEATER.

EFFECTS: LOSS OF EITHER PRIMARY OR SECONDARY BARREL HEATER ELEMENTS. REDUNDANCY EXISTS IN ALTERNATE HEATER.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2194 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR37

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-1, PCA-2
- 4) HDC AR37
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/1R
3/1R	TAL:	3/1R
3/1R	AOA:	3/1R
3/1R	ATO:	3/1R
3/3		
	3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [.P ] C [ P ]

LOCATION: 40V76A25AR37, 40V76A26AR37

PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

# EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY & SECONDARY HTR ELEMENTS OF THE WATER BARREL HEATER.

EFFECTS: LOSS OF EITHER PRIMARY OR SECONDARY HTR ELEMENTS OF THE

H20 BARREL HEATER. REDUNDANCY IN SECONDARY HTR ELEMENTS.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C MDAC ID: 2195 ABORT: 3/3 HYBRID DRIVER CONTROLLER TYPE III AR37 ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG FUEL CELL 2) 3) PCA-1, PCA-2 HDC AR37 4) 5) 6) 7) 8) WRS 05-6MA CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: 3/3 3/3 AOA: 3/3 3/3 ONORBIT: ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 40V76A25AR37, 40V76A26AR37 PART NUMBER: MC477-0263-002 CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE EFFECTS/RATIONALE: FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY & SECONDARY HTR ELEMENTS OF THE WATER BARREL HEATER. EFFECTS: NONE. REFERENCES:

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2196

ABORT:

3/1R

ITEM:

FUSE, 3 AMP

FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) FUSE F3
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V76A26F3

PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION,

CONTAMINATION, DEGRADED MATERIAL

## EFFECTS/RATIONALE:

FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR HDC'S AR5 AND AR36 AND PRIMARY HTR ELEMENTS OF NOZZLE HEATER. EFFECTS: LOSS PRIMARY HTR ELEMENTS OF NOZZLE HEATER. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO DUMP EXCESS PRODUCT H2O.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 2/1R

MDAC ID:

2197

ABORT:

2/1R

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5, AR36
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY

OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- PCA-2 3)
- HDC AR5, AR36 4)
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ]

C[P]

LOCATION: 40V76A26AR5, 40V76A26AR36

PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE: FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER FOR HTR ELEMENT OF

FC H2O NOZZLE HTR.

EFFECTS: LOSS OF ABILITYY TO DUMP H20 OVERBOARD WHEN NOZZLE

FREEZES. FC MAY POSSIBLY FLOOD. POSSIBLE CREW/VEHICLE LOSS. NO

REDUNDANT HTR ELEMENT.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2198

FLIGHT: 2/1R ABORT: 2/1R

ITEM:

HYBRID DRIVER CONTROLLER TYPE III AR5, AR36

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA-2
- 4) HDC AR5, AR36
- 5)
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ F ]

LOCATION:

40V76A26AR5 40V76A26AR36

PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL

SHOCK, STRUCTURAL FAILURE

# EFFECTS/RATIONALE:

FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER FOR HTR ELEMENT OF FC H2O NOZZLE HTR.

EFFECTS: POSSIBLE OVERHEATING OF H2O VENT NOZZLE WHICH COULD

DEGRADE THERMAL INSULATION

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2199 ABORT: 3/1R

ITEM: THERMAL SWITCH FAILURE MODE: FAILS OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) TIE BAR 10
- 4) THERMAL SWITCHES 172, 171, 272, 271, 372, 371
- 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		-

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

40V4STS171, 172 (REF)

PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL

SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:

CONTROLS PRODUCT WATER LINE HTR ELEMENTS. POSSIBLE LOSS OF MISSION WHEN ALL HEATING CAPABILITY IS LOST.

REFERENCES: ALSO THERMAL SWITCHES 272, 271, 372, 371

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/3

SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2200 ABORT: 3/3

ITEM: THERMAL SWITCH FAILURE MODE: FAILS CLOSED

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) TIE BAR 10
- 4) THERMAL SWITCHES 172, 171, 272, 271, 372, 371
- 5) 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
3/3		•
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V4STS171, 172 (REF)

PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

REFERENCES: ALSO THERMAL SWITCHES 272, 271, 372, 371

11/25/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID: 2201

ABORT:

3/1R

ITEM:

THERMAL SWITCH

FAILURE MODE: FAILS OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- 3) TIE BAR 8, 9
- THERMAL SWITCH 170, 270, 370, 072

5) 6)

7)

WRS 8)

9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING.	3 / 3		·

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 40V4STS170, 270, 370, 072

PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL

SHOCK

## EFFECTS/RATIONALE:

CONTROLS H20 RELIEF VALVES PRIMARY HEATER ELEMENTS AND PRIMARY HEATER ELEMENTS OF THE H20 RELIEF VENT LINE. POSSIBLE LOSS OF VEHICLE/CREW AFTER LOSS OF ALL HEATING NECESSARY TO FCP PRODUCT H2O.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/25/86 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3

ABORT: MDAC ID: 2202

ITEM: THERMAL SWITCH FAILURE MODE: FAILS CLOSED

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- EPG 1)
- 2) FUEL CELL
- TIE BAR 8, 9 3)
- THERMAL SWITCH 170, 270, 370, 072 4)
- 5) 6)
- 7)
- 8) WRS
- 9) 05-6MA

## CRITICALITIES

~*·~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		·

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V4STS170, 270, 370, 072

PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2203

FLIGHT: ABORT:

3/1R 3/1R

ITEM:

THERMAL SWITCH

FAILURE MODE: FAILS OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- TIE BAR 8, 9 3)
- THERMAL SWITCH 170, 270, 370, 071

5)

6)

7)

8) WRS 05-6MA

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
TANDING /CARING.	•		•

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

40V45MT170, 270, 370, 071

PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL

SHOCK

## EFFECTS/RATIONALE:

CONTROLS H20 RELIEF VALVES STANDBY HEATER ELEMENTS AND STANDBY HEATER ELEMENTS OF THE H20 RELIEF VENT LINE. POSSIBLE LOSS OF VEHICLE/CREW AFTER LOSS OF ALL HEATING NECESSARY TO FCP PRODUCT H20.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/3 MDAC ID: 2204 ABORT: 3/3

ITEM: THERMAL SWITCH FAILURE MODE: FAILS CLOSED

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) TIE BAR 8, 9
- 4) THERMAL SWITCH 170, 270, 370, 071
- 5)
- 6) 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

	O1/2 2 2 C1/2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3		·	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 40V45MT170, 270, 370, 071

PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

NONE.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 2/1R

MDAC ID: 2205

ABORT:

2/1R

ITEM:

TEMPERATURE CONTROLLER AR49, AR49

FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) FUEL CELL
- 3) PCA 1,2
- 4) TEMPERATURE CONTROLLER AR49, AR49
- 5) 6)
- 7)
- 8) WRS
- 9) 05-6MA

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

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REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:

40V76A25AR49, 6AR49

PART NUMBER: MC450-0062-0002

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, STRUCTURAL

**FAILURE** 

## EFFECTS/RATIONALE:

LOSS OF FC PRODUCT H20 OVERBOARD DUMP NOZZLE HEATER LOGIC. FREEZING OF NOZZLE AND FREEZING OF FCP. POSSIBLE LOSS OF CREW/VEHICLE.

DATE:

11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM:

EPD&C

FLIGHT:

C[P]

2/1R

MDAC ID:

2206

ABORT:

2/1R

ITEM:

TEMPERATURE CONTROLLER AR49, AR49

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- EPG 1)
- FUEL CELL 2)
- PCA 1,2 3)
- TEMPERATURE CONTROLLER AR49, AR49 4)
- 5)
- 6)
- 7)
- 8) WRS 9) 05-6MA

CRITICALITIES

HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 2/1R PRELAUNCH: 3/3 2/1R TAL: 2/1R LIFTOFF: 2/1R AOA: 2/1R ONORBIT: 2/1R ATO: 2/1R DEORBIT: LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A[1] B [ F ]

LOCATION:

40V76A25AR49, 6AR49

PART NUMBER: MC450-0062-0002

VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, STRUCTURAL CAUSES:

FAILURE

EFFECTS/RATIONALE:

LOSS OF FC PRODUCT H20 OVERBOARD DUMP NOZZLE HEATER LOGIC.

POSSIBLE LOSS OF FUNCTION AND EVENTUAL LOSS OF FCP.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

2/1R FLIGHT: 2/1R

MDAC ID:

2207

ABORT:

ITEM:

FCP 1,2,3 HTR PWR ON IND. 5.1K RESISTOR

FAILURE MODE: OPEN, ELEMENT OPENS, HIGH RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- FUEL CELL 2)
- TERM BD. 40TB13V, 135, 136 3)
- RESISTOR, MODULE ASSY 5.1K OHMS 4)

5)

6)

7) 8)

9) 05-6MA

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	2/1R	
LIFTOFF:	2/1R	TAL:	2/1R	
ONORBIT:	2/1R	AOA:	2/1R	
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING:	3/3		·	

LANDING/SATING: 3/3

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

TB134, 135, 136 LOCATION:

PART NUMBER: RLR07C5101GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

# EFFECTS/RATIONALE:

LOSS OF MEASUREMENT SIGNAL FOR FCP END CELL HTR STATUS. LOSS OF ABILITY TO DETECT "FAILED ON" HTR. FAILED "ON" HTR COULD CAUSE CATASTROPHIC FC FAILURE.

DATE: 11/25/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2221

FLIGHT:
ABORT:

2/1R 2/1R

ITEM:

SWITCH, FUEL CELL 1, 2, 3 REACTANTS

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2
- 4) SWITCH, S1, S7, S4
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

### CRITICALITIES

	V. 1			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	2/1R	
LIFTOFF:	2/1R	TAL:	2/1R	
ONORBIT:	2/1R	AOA:	2/1R	
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A1A2S1, S7, S4

PART NUMBER: ME452-0102-7205

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

# EFFECTS/RATIONALE:

LOSS OF ABILITY TO OPERATE REACTANT SUPPLY VALVES. POSSIBLE LOSS OF ABILITY TO SHUTDOWN REACTANTS TO A FCP IF NECESSARY. POSSIBLE LOSS OF CREW/VEHICLE WITH FAILURE TO SHUTDOWN A FCP.

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE: 2/1R SUBSYSTEM: EPD&C FLIGHT:

2/1R ABORT: MDAC ID: 2222

ITEM: SWITCH, FUEL CELL 1, 2, 3 REACTANTS FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2
- SWITCH, S1, S7, S4 4)
- 5) 6)
- 7) 8)
- 9) 05-6MB

# CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	2/1R
2/1R	TAL:	2/1R
2/1R	AOA:	2/1R
2/1R	ATO:	2/1R
3/3		·
	3/3 2/1R 2/1R 2/1R	3/3 RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO:

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

LOCATION: 32V73A1A2S1, S7, S4

PART NUMBER: ME452-0102-7205

CAUSES: CONTAMINATION, SHOCK, VIBRATION

# EFFECTS/RATIONALE:

POSSIBLE LOSS OF FCP WITH THE INADVERTENT SHUTDOWN OF REACTANT VALVE SUPPLY. POSSIBLE LOSS OF CREW/VEHICLE WITH LOSS OF FCP.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R

MDAC ID: 2223 ABORT: 3/1R

ITEM: SWITCH, H2 TANK 1-4 PRIMARY HEATER CONTROL

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH, S11, 19, 24, 4
- 5)
- 6)
- 7)
- 9) 05-6MB

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
ONORBIT:	3/1R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING:	3/3		•	

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2S11, 19, 24, (REF)

PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:

LOSS OF PRIMARY H2 TANK HEATER ELEMENTS. REDUNDANCY IN SECONDARY

HTRS.

REFERENCES: ALSO Allals4

HIGHEST CRITICALITY HDW/FUNC 11/25/86 DATE:

1/1 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: MDAC ID: 2224

SWITCH, H2 TANK 1-4 PRIMARY HEATER CONTROL ITEM:

FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- PRSDS 2)
- PNL R1A2, Al1A1 3)
- SWITCH, S11, 19, 24, 4
- 5) 6)
- 7)
- 8)
- 9) 05-6MB

CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3 🗆 🚟
DEORBIT:	1/1	ATO:	3/3
LANDING/SAFING:	1/1		•

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

LOCATION: 32V73A1A2S11, 19, 24, (REF)

CAUSES: CONTAMINATION, SHOCK, VIBRATION

# EFFECTS/RATIONALE:

INABILITY TO CONTROL HEATING OF H2 TANK. FAILURE OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO Alla1S4

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2225 ABORT: 2/1R

ITEM: SWITCH, H2 TANK 1-4 STANDBY HEATER CONTROL

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH, S12, 20, 25, 5
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 32V73A1A2S12, 20, 25, (REF)

PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

# EFFECTS/RATIONALE:

LOSS OF SECONDARY H2 TANK HEATER ELEMENTS. LOSS OF H2 TANK DUE TO INSUFFICIENT HEATING. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FCP REACTANTS AND POSSIBLE LOSS OF FUEL CELL.

REFERENCES: ALSO Allais5

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 1/1 MDAC ID: 2226 ABORT: 3/3

ITEM: SWITCH, H2 TANK 1-4 STANDBY HEATER CONTROL

FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH, S12, 20, 25, 5
- 5) 6)
- 7)
- 8)
- 9) 05-6MB

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	3/3
LANDING/SAFING:	1/1		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 32V73A1A2S12, 20, 25, (REF)

PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

INABILITY TO CONTROL HEATING OF H2 TANK. FAILURE OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO Allais5

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2227 ABORT: 3/1R

ITEM: SWITCH, O2 TANK 1-4 TEST/RESET CONTROL

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH, S10, 15, 23, S3
- 5)
- 6) 7)
- 7) 8)
- 9) 05-6MB

### CRITICALITIES

~			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2S10, 15, 23, (REF)

PART NUMBER: ME452-0102-7205

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO TEST AND RESET CIRCUITRY FOR THE O2 TANKS. POSSIBLE LOSS OF O2 TANK. POSSIBLE LOSS OF FUEL CELL DUE TO LOSS OF REACTANTS. POSSIBLE LOSS OF CREW/VEHICLE.

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

2/1R FLIGHT:

MDAC ID:

2228

2/1R ABORT:

ITEM: SWITCH, O2 TANK 1-4 TEST/RESET CONTROL FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

# BREAKDOWN HIERARCHY:

- 1) EPG
- PRSDS 2)
- 3) PNL R1A2, AllA1
- SWITCH, S10, 15, 23, S3 4)
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

### CRITICALITIES

V1/2 V1 122		
HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	2/1R
2/1R	TAL:	2/1R
2/1R	AOA:	2/1R
2/1R	ATO:	2/1R
3/3		-
	HDW/FUNC 3/3 2/1R 2/1R 2/1R	HDW/FUNC ABORT  3/3 RTLS:  2/1R TAL:  2/1R AOA:  2/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A1A2S10, 15, 23, (REF)

PART NUMBER: ME452-0102-7205

CAUSES: CONTAMINATION, SHOCK, VIBRATION

# EFFECTS/RATIONALE:

LOSS OF ABILITY TO TEST AND RESET CURRENT LEVEL DETECTORS. SHORT COULD CAUSE POSSIBLE EXPLOSION IN O2 TANK AND LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2229 ABORT: 3/1R

ITEM: SWITCH, O2 TANK 1-4 PRIMARY HEATER CONTROL

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH S8,13,21,S1
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2S8, 13, 21 (REF)

PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

# EFFECTS/RATIONALE:

LOSS OF PRIMARY O2 TANK HEATER ELEMENTS. REDUNDANCY IN STANDBY HEATERS. MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 1/1 MDAC ID: 2230 ABORT: 3/3

ITEM: SWITCH, O2 TANK 1-4 PRIMARY HEATER CONTROL

FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH S8,13,21,51
- 5)
- 6) 7)
- 8)
- 9) 05-6MB

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	3/3
LANDING/SAFING:	1/1		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

32V73A1A2S8, 13, 21 (REF)

PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

INABILITY TO CONTROL HEATING OF O2 TANK. FAILURE OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2231 ABORT: 2/1R

ITEM: SWITCH, O2 TANK 1-4 STANDBY HEATER CONTROL

FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2, A11A1
- 4) SWITCH S9, 14, 22, S2
- 5)
- 6) 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		. •

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: 32V73A1A2S9, 14, 22 (REF)

PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

## EFFECTS/RATIONALE:

LOSS OF STANDBY O2 TANK HEATER ELEMENTS. LOSS OF O2 TANK DUE TO INSUFFICIENT HEATING. POSSIBLE LOSS OF CREW/VEHICLE AFTER LOSS OF ASSOCIATED FCP..

REFERENCES: ALSO 36V73A11A1S2

11/28/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2232

FLIGHT: ABORT:

1/1 3/3

ITEM:

SWITCH, O2 TANK 1-4 STANDBY HEATER CONTROL

FAILURE MODE: SHORTS, INADVERTANTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- EPG 1)
- 2) PRSDS
- PNL R1A2, AllAl 3)
- SWITCH S9, 14, 22, S2 4)
- 5) 6)
- 7) 8)
- 05-6MB

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	3/3
LANDING/SAFING:	1/1		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION:

32V73A1A2S9, 14, 22 (REF)

PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION'STRUCTURAL FAILURE,

CONTAMINATION

EFFECTS/RATIONALE:

INABILITY TO CONTROL HEATING OF 02 TANK. LOSS OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO 36V73A11A1S2

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2233 ABORT: 2/1R

ITEM: RESISTORS, 1.2 KOHM, 2 WATT

FAILURE MODE: OPEN, ELEMENT OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2
- 4) RESISTORS A2R1, R11, R12, A2R2, R10
- 5) 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

01/2 1 T 01111 1 T T D		
HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	2/1R
2/1R	TAL:	2/1R
2/1R	AOA:	2/1R
2/1R	ATO:	2/1R
: 3/3		•
	HDW/FUNC 3/3 2/1R 2/1R 2/1R	3/3 RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: 32V73A1A2A1R1,R5,R11,R12 (REF)

PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO OPERATE THE O2 AND H2 FCP SUPPLY VALVES. POSSIBLE LOSS OF FCP DUE TO LACK OF REACTANTS. LOSS OF CREW/VEHICLE POSSIBLE.

REFERENCES: ALSO 32V73A1A2A2R2,R10

HIGHEST CRITICALITY HDW/FUNC 11/28/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2234 ITEM: RESISTORS, 1.2 KOHM, 2 WATT FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON BREAKDOWN HIERARCHY: 1) EPG 2) PRSDS 3) PNL R1A2 RESISTORS A2R1, R11, R12, A2R2, R10 5) 6) 7) 8) 05-6MB CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 3/3 RTLS: PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: DEORBIT: 3/3 ATO: 3/3 3/3 LANDING/SAFING: REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: 32V73A1A2A1R1,R5,R11,R12 (REF) PART NUMBER: RWR80S1211FR CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK **EFFECTS/RATIONALE:** NONE.

REFERENCES: ALSO 32V73A1A2A2R2,R10

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2235 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER 10A

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY

OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- 4) RPC (REF)
- 5)
- 6)
- 7)
- 9) 05-6MB

#### CRITICALITIES

	~1/1 1 1 V112 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: REF

PART NUMBER: MC450-0017-1100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK,

VIBRATION

## EFFECTS/RATIONALE:

PROVIDES POWER TO 02 TANK HEATERS. REDUNDANCY IN SECONDARY HTRS. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141RPC5 THRU 12, 2RPC5 THRU 12, 3RPC5 THRU 12, 4RPC5 THRU 12

11/28/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2236

FLIGHT: ABORT:

3/1R 3/1R

REMOTE POWER CONTROLLER 10A

ITEM: FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- RPC (REF) 4)
- 5)
- 6)
- 7) 8)
- 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	•		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

REF

PART NUMBER: MC450-0017-1100

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL SHOCK, VIBRATION

### EFFECTS/RATIONALE:

PROVIDES POWER TO 02 TANK HEATERS. ONE SERIES RPC FAILURE WILL NOT CAUSE OVERHEATING. DUAL FAILURES WILL CAUSE OVERHEATING AND LOSS OF 02 BY CONTINUOUSLY POWERING HEATER ELEMENT.

REFERENCES: 40V76A141RPC5 THRU 12, 2RPC5 THRU 12, 3RPC5 THRU 12, 4RPC5 THRU 12

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2237

3/1R FLIGHT: 3/1R ABORT:

ITEM: REMOTE POWER CONTROLLER 5A

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/02 CONTROL BOX 1,2,3,4
- 4) RPC (REF)
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

#### CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFIN	G: 3/3		-

B[P] C[P] REDUNDANCY SCREENS: A [ 1 ]

LOCATION:

REF

PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK,

VIBRATION

#### EFFECTS/RATIONALE:

PROVIDES POWER TO H2 TANK HEATERS. LOSS OF H2 TANK DUE TO INSUFFICIENT HEATING OF TANK. REDUNDANCY IN SECONDARY HEATERS.

REFERENCES: 40V76A141RPC1 THRU 4, 2RPC1 THRU 4, 3RPC1 THRU 4, 4RPC1 THRU 4

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2238 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER 5A

FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- 4) RPC (REF)
- 5) 6)
- 7)
- 8) 9) 05-6MB

### CRITICALITIES

7:10 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION: REF

PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL SHOCK, VIBRATION

## EFFECTS/RATIONALE:

PROVIDES POWER TO H2 TANK HEATERS. FAILURE OF TWO RPC'S IN SERIES WILL CAUSE CONTINUOUS HEATING OF H2 TANK AND LOSS OF H2 TANK. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141RPC1 THRU 4, 2RPC1 THRU 4, 3RPC1 THRU 4, 4RPC1 THRU 4

DATE: 11/28/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

2/1R

MDAC ID: 2239

ABORT:

2/1R

ITEM:

HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, OPEN

CONTROL

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT INADVERTENTLY

**OPENS** 

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) MID PCA 1,2&3
- 4) HDC (REF)
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

(REF)

PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

### EFFECTS/RATIONALE:

LOSS OF POWER TO ASSOCIATED F/C SUPPLY VALVE. ADDITONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REACTANTS AND HAVE RESULTING FCP SHUTDOWN.

REFERENCES: 40V76A25AR23,24,25,26, 6AR23,24,25,26, 7AR15,16,17,18

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 2/1R

MDAC ID: 2240 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, OPEN

CONTROL

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) MID PCA 1,2&3
- 4) HDC (REF)
- 5)
- 6) 7)
- 8)
- 9) 05-6MB

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	: 3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ F ] C [ P ]

LOCATION:

(REF)

PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

#### EFFECTS/RATIONALE:

PROVIDES POWER TO FC SUPPLY VALVES. ONE SERIES HDC FAILURE WILL NOT CAUSE LOSS OF FUNCTION. DUAL FAILURES PREVENT THE OPENING OF VALVE. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A25AR23,24,25,26, 6AR23,24,25,26, 7AR15,16,17,18

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2241 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, CLOSE

CONTROL

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY

**OPENS** 

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) MID PCA 1,2&3
- 4) HDC (REF)
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC477-0263-0002

(REF)

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

LOSS OF POWER TO ASSOCIATED F/C CLOSE SUPPLY VALVE. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ABILITY TO CLOSE VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO SHUTDOWN A FCP.

REFERENCES: 40V76A25AR25,27,28,29,30, 6AR27,28,29,30, 7AR19,20,21,22

HIGHEST CRITICALITY HDW/FUNC 11/28/86 DATE: FLIGHT: 2/1R SUBSYSTEM: EPD&C

2/1R ABORT: MDAC ID: 2242

HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, CLOSE ITEM:

CONTROL

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- MID PCA 1,2&3 3)
- 4) HDC (REF)
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: (REF)

PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

PROVIDES POWER TO FC CLOSE VALVES. ONE SERIES HDC FAILURE WILL NOT CAUSE LOSS OF FUNCTION. DUAL FAILURES PREVENT THE CLOSURE OF VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO SHUTDOWN FAILED FCP.

REFERENCES: 40V76A25AR25,27,28,29,30, 6AR27,28,29,30, 7AR19,20,21,22

DATE: 11/28/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2243

FLIGHT:
ABORT:

2/1R 2/1R

ITEM:

DIODE, ISOLATION

FAILURE MODE: OPEN, FAILS OPEN, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) MID PCA 1,2&3
- 4) DIODES (REF)
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	2/1R	
LIFTOFF:	2/1R	TAL:	2/1R	
ONORBIT:	2/1R	AOA:	2/1R	
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING	: 3/3	•	•	

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

(REF)

PART NUMBER: JANTXV1N4246

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL

SHOCK

EFFECTS/RATIONALE:

LOSS OF ABILITY TO OPEN OR CLOSE A FCP REACTANT VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO SUBSEQUENT LOSS OF FAILED FCP. POSSIBLE REACTANT CROSSOVER.

REFERENCES: 40V76A25A1CR31,33,35,37, 6A1CR31,33,35,37, 7A1CR15,17,19,21

DATE: SUBSYSTEM: MDAC ID:				HIGH		TICALI FLIGHT: ABORT:		W/FUNC 3/3 3/3
ITEM: FAILURE MODE				ORT (D	OES NO	r BLOCK	<b>;</b> )	
LEAD ANALYST	: J. PATTO	N	SUBSY	S LEA	D: K. S	CHMECK	PEPER	
BREAKDOWN HI  1) EPG 2) PRSDS 3) MID PCA 4) DIODES 5) 6) 7)	1,2&3							
8) 9) 05-6MB				-			•	
		C	RITICAL	TTTES				
PRELAU LIFTOI ONORBI DEORBI	FF: CT:	HDW/FU 3/3 3/3 3/3 3/3	NC	AB		3/	3 3 3	
REDUNDANCY SO	CREENS: A	A [	]	В [	]	c [	]	
LOCATION: PART NUMBER:	(REF) JANTXV1N4	1246			. 177	- 		
CAUSES: THEF	RMAL STRESS	, con	TAMINAT	NOI	* ***	1 :::::::::::::::::::::::::::::::::::::		
EFFECTS/RATIONONE.								
	rati tuli. M <del>istoria</del> no					e en	-1	10. 30
REFERENCES:		.1CR31,	,33,35,3	17, 6A	1CR31,	33,35,3	7,	

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2247 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B CONTROL FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY

OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- 4) HDC (REF)
- 5)
- 6)
- 7)
- 8) 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: (REF)

PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

PROVIDES POWER TO RPC'S CONTROLLING O2 TANK HEATERS. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE THE LOSS OF TANK. REDUNDANCY IN STANDBY HTRS.

REFERENCES: 40V76A141AR12,14,19,21, 2AR12,14,19,21, 3AR12,14,19,21, 4AR12,14,19,21

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 2/1R MDAC ID: 2248 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B CONTROL

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- 4) HDC (REF)
- 5)
- 6) 7)
- 7)
- 9) 05-6MB

#### CRITICALITIES

	V-1		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3	•	• •

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

(REF)

PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

### EFFECTS/RATIONALE:

POSSIBLE CONTINUOUS HEATING OF 02 TANK HTR ELEMENT. DUAL FAILURES CAUSE HDC'S TO ENERGIZE HTR. POSSIBLE DAMAGE AND LOSS OF AFFECTED TANK. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141AR12,14,19,21, 2AR12,14,19,21, 3AR12,14,19,21, 4AR12,14,19,21

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2249 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B INHIBIT FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- 4) HDC (REF)
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/1R	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: (REF)

PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

#### EFFECTS/RATIONALE:

FAILURE OF CIRCUITRY TO INHIBIT O2 TANK HTR. REDUNDANT HTR CIRCUITS AVAILABLE. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE. POSSIBLE CONTINUOUS HEATING OF O2 TANK.

REFERENCES: 40V76A141AR13,15,20,22, 2AR13,15,20,22, 3AR13,15,20,22, 4AR13,15,20,22

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2250

ABORT:

3/1R

ITEM:

HYBRID DRIVER CONTROLLER, O2 HTR A&B INHIBIT

FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS

PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) H2/O2 CONTROL BOX 1,2,3,4
- HDC (REF) 4)
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

T-12		
HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/1R	TAL:	3/3
3/1R	AOA:	3/3
3/1R	ATO:	3/1R
: 3/3	£ <u>Taji</u> T	
	3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: (REF)

PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

HTR CONTROL CIRCUITRY INHIBITED BY LATCHING HDC. POSSIBLE LOSS OF ONE HTR ELEMENT OF O2 TANK. REDUNDANT HEATER AVAILABLE. CONTINUOUS HEATING OF TANK POSSIBLE WITH LOSS OF TANK AND POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141AR13,15,20,22, 2AR13,15,20,22, 3AR13,15,20,22, 4AR13,15,20,22

DATE: SUBSYSTEM: EPD&C

11/28/86

HIGHEST CRITICALITY HDW/FUNC

MDAC ID:

FLIGHT:

3/1R

2251

ABORT:

3/1R

ITEM:

CURRENT LEVEL DETECTOR, O2 TANK HTR

FAILURE MODE: LOSS OF OUTPUT, INADVERTENTLY OPENS, FAILS TO

PROVIDE OUTPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- H2/O2 CONTROL BOX 1,2,3,4 3)
- 4) CURRENT LEVEL DETECTOR
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	•		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: O2 TANKS 1 THRU 4 PART NUMBER: MC431-0137-0001

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL STRESS

## EFFECTS/RATIONALE:

DUAL FAILURES WOULD HAVE TO OCCUR BEFORE CONTINUOUSLY ENERGIZING HTR. MANUAL SHUTDOWN OF CONTROLLING RPC'S WOULD REMOVE POWER TO AFFECTED HTR.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID:

2252

ABORT:

3/1R

ITEM:

CURRENT LEVEL DETECTOR, O2 TANK HTR

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- H2/02 CONTROL BOX 1,2,3,4 3)
  - CURRENT LEVEL DETECTOR
- 5)
- 6)
- 7)
- 8)
- 05-6MB

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: O2 TANKS 1 THRU 4

PART NUMBER: MC431-0137-0001

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL STRESS, VIBRATION # (1949 # 618 0) Undergree (1946 )

## EFFECTS/RATIONALE:

LOSS OF O2 TANK HTR SHORT PROTECTION. LOSS OF ABILITY TO INHIBIT ASSOCIATED O2 TANK HEATER CIRCUITRY. POSSIBLE LOSS OF TANK DUE TO OVERPRESSURIZATION. POSSIBLE LOSS OF CREW/VEHICLE.

DATE: 11/28/86

HDW/FUNC HIGHEST CRITICALITY

SUBSYSTEM: EPD&C MDAC ID: 2253

FLIGHT: ABORT:

3/1R 3/1R

ITEM:

O2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORTS TO GND

SUBSYS LEAD: K. SCHMECKPEPER LEAD ANALYST: J. PATTON

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- PNL R1A2/MID PCA1 3)
- CIRCUIT, VALVE CONTROL 4)

5)

6) 7)

8)

9) 05-6MB

#### CRITICALITIES

V1/2 2 4 V1/2 2 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
HDW/FUNC	ABORT	HDW/FUNC		
3/3	RTLS:	3/1R		
3/1R	TAL:	3/1R		
3/1R	AOA:	3/1R		
3/1R	ATO:	3/1R		
: 3/3		*		
	3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C[P]

LOCATION:

SHEET 1

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

### EFFECTS/RATIONALE:

LOSS OF ABILITY TO ISOLATE SUBASSY #1. POSSIBLE DEGRADATION OF FC 2 AND 3. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R

MDAC ID: 2254 ABORT: 3/1R

ITEM: O2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA1
- 4) CIRCUIT, VALVE CONTROL

5)

7)

8)

9) 05-6MB

# CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 1
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:
MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF ALL
REDUNDANCY. DEGRADATION OF FCP 1 AND FCP 3. REDUNDANCY IN
CROSSOVER VALVE.

HDW/FUNC HIGHEST CRITICALITY 11/28/86 FLIGHT: 3/3 SUBSYSTEM: EPD&C 3/3 ABORT: 2255 MDAC ID: H2 GSE SUPPLY VALVE CONTROL CIRCUIT ITEM: FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, INADVERTENT OPEN, SHORTS TO GND LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) PRSDS 3) MID PCA1 CIRCUIT, VALVE CONTROL 4) 5) 6) 7) 8) 9) 05-6MB CRITICALITIES HDW/FUNC HDW/FUNC ABORT FLIGHT PHASE RTLS: 3/3 PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: 3/3 ONORBIT: 3/3 AOA: 3/3 ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 C [ REDUNDANCY SCREENS: A [ ] B [ ] LOCATION: SHEET 3 PART NUMBER: VS70-450212 CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, **VIBRATIONS** EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC 11/28/86 DATE: FLIGHT: 3/3 SUBSYSTEM: EPD&C 2256 ABORT: 3/3 MDAC ID: ITEM: H2 GSE SUPPLY VALVE CONTROL CIRCUIT FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS TO CLOSE LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG PRSDS 2) 3) MID PCA1 CIRCUIT, VALVE CONTROL 4) 5) 6) 7) 8) 9) 05-6MB CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: PRELAUNCH: 3/3 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 ATO: DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] CI ВГТ LOCATION: SHEET 3 PART NUMBER: VS70-450212 CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS EFFECTS/RATIONALE: NONE. REFERENCES:

HIGHEST CRITICALITY HDW/FUNC 11/28/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C ABORT: 3/3 MDAC ID: 2257 O2 GSE SUPPLY VALVE CONTROL CIRCUIT ITEM: FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, INADVERTENT OPEN LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: EPG 1) 2) PRSDS 3) MID PCA NO. 1 CIRCUIT, VALVE CONTROL 4) 5) 6) 7) 8) 05-6MB CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 PRELAUNCH: 3/3 LIFTOFF: 3/3 TAL: AOA: ONORBIT: 3/3 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

REDUNDANCI SCREENS. A [ ] B [ ]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:

NONE.

HIGHEST CRITICALITY HDW/FUNC 11/28/86 DATE: 3/3 FLIGHT: SUBSYSTEM: EPD&C 3/3 ABORT: 2258 MDAC ID: O2 GSE SUPPLY VALVE CONTROL CIRCUIT ITEM: FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER BREAKDOWN HIERARCHY: 1) EPG 2) PRSDS MID PCA NO. 1 3) CIRCUIT, VALVE CONTROL 4) 5) 6) 7) 8) 9) 05-6MB CRITICALITIES \*\*\* HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: TAL: 3/3 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [ ] B [ ] C [ ] LOCATION: SHEET 3 PART NUMBER: VS70-450212 CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS EFFECTS/RATIONALE: NONE. REFERENCES:

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DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2259 ABORT: 3/1R

ITEM: O2 PRIMARY ECLSS VALVE #1 SUPPLY SYS.

FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL L2A1/MID PCA1
- 4) CIRCUIT, VALVE CONTROL
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

## CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO OPEN OR CLOSE O2 SYSTEM #1 (PRIMARY) O2 SUPPLY VALVE TO PROVIDE O2 TO ECLSS. REDUNDANCY IN SECONDARY ECLSS O2 VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF O2 AND ASSOCIATED FCP.

11/28/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID: 2260

ABORT:

3/1R

ITEM: O2 PRIMARY ECLSS VALVE #1 SUPPLY SYS.

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- PNL L2A1/MID PCA1 3)
- CIRCUIT, VALVE CONTROL

5)

6)

7)

8)

05-6MB

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	: 3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ]

C [ P ]

LOCATION: SHEET 3

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

## EFFECTS/RATIONALE:

DUAL FAILURE WOULD HAVE TO OCCUR BEFORE PREMATURE OPERATION. VALVE IS NORMALLY OPEN DURING FLIGHT. CREW CONTROL WILL RESET FAILURE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LACK OF SUFFICIENT 02 TO ECLSS. REDUNDANT PATHS TO SUPPLY ECLSS AVAILABLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2261 ABORT: 3/1R

ITEM: H2 MANIFOLD 2 ISOLATION VLV CNTL CIRCUIT FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORTS TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA2
- 4) CIRCUIT, VALVE CONTROL
- 5)
- 6) 7)
- 7) 8)
- 9) 05-6MB

#### CRITICALITIES

41/1 1 41/1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
HDW/FUNC	ABORT	HDW/FUNC		
3/3	RTLS:	3/1R		
3/1R	TAL:	3/1R		
3/1R	AOA:	3/1R		
3/1R	ATO:	3/1R		
3/3		•		
	HDW/FUNC 3/3 3/1R 3/1R 3/1R	3/3 RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 2
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

#### EFFECTS/RATIONALE:

LOSS OF ABILITY TO ISOLATE SUBASSY #1. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE DEGRADATION OF FC 2 AND 3. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R ABORT: 3/1R

MDAC ID:

2262

H2 MANIFOLD 2 ISOLATION VLV CNTL CIRCUIT ITEM: FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- PRSDS 2)
- PNL R1A2/MID PCA2 3)

CIRCUIT, VALVE CONTROL 4)

5)

6)

7)

8)

9) 05-6MB

	CRITICALITIES		TERM OF THE STREET
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:		•	

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 2 PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:

ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REDUNDANCY. DEGRADATION OF FCP 2 AND FCP 3. CREW ACTION REQUIRED TO RESET LATCHING SOLENOID.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R

MDAC ID: 2263 ABORT: 3/1R

ITEM: H2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA1
- 4) CIRCUIT, VALVE CONTROL
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

### CRITICALITIES

	7.12.2.7.12.2.7.7.7		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 2
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

#### EFFECTS/RATIONALE:

VALVE NORMALLY OPEN DURING FLIGHT. LOSS OF ABILITY TO ISOLATE SUB ASSY #2. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

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11/28/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R ABORT: 3/1R

MDAC ID: 2264

ITEM: H2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- PRSDS 2)
- PNL R1A2/MID PCA1 3)
- CIRCUIT, VALVE CONTROL 4)

6)

7)

8)

9) 05-6MB

#### CRITICALITIES -

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		,

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 2

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE: The state of the state of

ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL

REDUNDANCY. DEGRADATION OF FCP 1 AND FCP 3. VALVE NORMALLY OPEN

DURING FLIGHT.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2265 ABORT: 3/1R

ITEM:
O2 MANIFOLD 2 ISOL VLV CONTROL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA2
- 4) CIRCUIT, VALVE CONTROL
- 5)
- 6) 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

**************************************			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

SHEET 1

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO ISOLATE SUBASSY #1. POSSIBLE DEGRADATION OF FC 2 AND 3. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2266

FLIGHT: ABORT:

3/1R 3/1R

ITEM: O2 MANIFOLD 2 ISOL VLV CONTROL CIRCUIT FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA2
- 4) CIRCUIT, VALVE CONTROL

5)

6)

7)

8)

9) 05-6MB

#### CRITICALITIES =

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 1

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:

ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REDUNDANCY. DEGRADATION OF FCP 2 AND FCP 3. CREW CAN RESET LATCHING SOLENOID.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R

MDAC ID: 2267 ABORT: 3/1R

ITEM: FCP 1 REACTANT VLV CNTL CIRCUIT

FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA1
- 4) CIRCUIT, VALVE CONTROL
- 5)
- 6)
- 7) 8)
- 9) 05-6MB

#### CRITICALITIES

	41/2 2 2 41/2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

## EFFECTS/RATIONALE:

LOSS OF ABILITY TO MONITOR VALVE POSITION THROUGH PWR, CNTL AND TKBK CIRCUIT. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

DATE:

11/28/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID:

2268

FLIGHT: ABORT:

3/1R 3/1R

ITEM:

FCP 1 REACTANT VLV CNTL CIRCUIT

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON

SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/MID PCA1
- CIRCUIT, VALVE CONTROL 4)

5)

6)

7)

8)

9) 05-6MB

## CRITICALITIES

	**************************************		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ]

B[P] C[P]

LOCATION: SHEET 4

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:

ADDITINAL FAILURE MUST OCCUR BEFORE INITIATION OF FUNCTION. CREW ACTION NECESSARY TO RECONFIGURE TKBK CIRCUIT. POSSIBLE LOSS OF CREW/VEHICLE.

DATE:

11/28/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT:

3/1R

MDAC ID:

2269

ABORT:

3/1R

FCP 2 REACTANT VLV CNTL CKT

FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- PNL R1A2/MID PCA2 3)
- CIRCUIT, VALVE CONTROL 4)
- 5)
- 6)
- 7)
- 8) 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE H	IDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION:

SHEET 4

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

# EFFECTS/RATIONALE:

LOSS OF ABILITY TO MONITOR VALVE POSITION THROUGH PWR, CNTRL AND TKBK CIRCUIT. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

11/28/86

HIGHEST CRITICALITY HDW/FUNC

FLIGHT:

3/1R

SUBSYSTEM: EPD&C MDAC ID: 2270

ABORT:

3/1R

ITEM:

FCP 2 REACTANT VLV CNTL CKT - - -

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- PRSDS 2)
- 3) PNL R1A2/MID PCA2
- CIRCUIT, VALVE CONTROL 4)

5)

6) 7)

8)

9) 05-6MB

#### CRITICALITIES

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	70/00000		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
TANDING/SAFING	3/3		·

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C[P]

LOCATION: SHEET 4

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:

ADDITIONAL FAILURE MUST OCCUR BEFORE INITIATION OF FUNCTION. CREW ACTION NECESSARY TO RECONFIGURE TKBK CIRCUIT. POSSIBLE LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C MDAC ID: 2271

FLIGHT: ABORT:

3/1R 3/1R

ITEM:

FCP 3 REACTANT VLV CNTL CIRCUIT

FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- PRSDS 2)
- PNL R1A2/MID PCA3 3)
- CIRCUIT, VALVE CONTROL 4)
- 5)
- 6)
- 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•	·	•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C[P]

LOCATION: SHEET 4 PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

# EFFECTS/RATIONALE:

LOSS OF ABILITY TO MONITOR VALVE POSITION THROUGH PWR, CNTL AND TKBK CIRCUIT. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R ABORT: 3/1R

MDAC ID: 2272

ITEM:

FCP 3 REACTANT VLV CNTL CIRCUIT

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- PNL R1A2/MID PCA3
- CIRCUIT, VALVE CONTROL 4)

5)

6)

7)

8)

9) 05-6MB

# CRITICALITIES

	~= ·= · · · ·		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEET 4

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE: ADDITIONAL FAILURE MUST OCCUR BEFORE INITIATION OF FUNCTION. CREW ACTION NECESSARY TO RECONFIGURE TKBK CIRCUIT. POSSIBLE LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: EPD&C FLIGHT: 3/1R

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2273 ABORT: 3/1R

ITEM: O2 SECONDARY ECLSS VLV NO. 2 SUPPLY SYS FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL L2A1/MID PCA2
- 4) CIRCUIT, VALVE CONTROL
- 5)
- 6)
- 7)
- 9) 05-6MB

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/3		

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

# EFFECTS/RATIONALE:

LOSS OF ABILITY TO OPEN OR CLOSE O2 SYSTEM #2 (SECONDARY) O2 SUPPLY VALVE TO PROVIDE O2 TO ECLSS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF O2 AND ASSOCIATED FCP.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/28/86 SUBSYSTEM: EPD&C FLIGHT: 3/1R

3/1R ABORT: MDAC ID: 2274

O2 SECONDARY ECLSS VLV NO. 2 SUPPLY SYS ITEM:

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

## BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL L2A1/MID PCA2
- CIRCUIT, VALVE CONTROL

5)

6) 7)

8)

9) 05-6MB

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	<b>VIII</b>		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		·

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: SHEET 3 PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE: DUAL FAILURE WOULD HAVE TO OCCUR BEFORE PREMATURE OPERATION. CREW CONTROL CAN RESET FAILURE. POSSIBLE LOSS OF CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2275 ABORT: 3/3

ITEM: H2 HEATER A&B CONTROL CIRCUITS FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL 02/13/R1A2/H2/O2 BOX
- 4) CIRCUIT, HEATER CONTROL
- 5)
- 6) 7)
- 7) 8)
- 9) 05-6MB

# CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		•

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SHEETS 5 THRU 8 PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

# EFFECTS/RATIONALE:

LOSS OF ABILITY TO CONTROL HTRS IN H2 TANKS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INSUFFICIENT HEATING OF H2 TANK AND EVENTUAL LOSS OF REACTANTS. REDUNDANCY IN SECONDARY HEATERS.

HIGHEST CRITICALITY HDW/FUNC DATE: 11/28/86

FLIGHT: 3/1R SUBSYSTEM: EPD&C 3/1R MDAC ID: 2276 ABORT:

H2 HEATER A&B CONTROL CIRCUITS ITEM:

FAILURE MODE: INADVERTENT OPEN, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAILS CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- EPG 1)
- 2) PRSDS
- PNL 02/13/R1A2/H2/O2 BOX 3)
- 4) CIRCUIT, HEATER CONTROL

5)

6)

7)

8)

9) 05-6MB

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: SHEETS 5 THRU 8

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:

TANK NORMALLY OPERATED IN "AUTO" MODE. MANUAL CONTROL BY CREW WHEN "AUTO" FAILS. HEATERS ARE PREVENTED FROM OVERHEATING AND TANKS HAVE MECHANICAL RELIEF VALVE FOR OVERPRESSURIZATION PROTECTION. POSSIBLE LOSS OF H2 TANK BY EXPLOSION AND CREW/VEHICLE.

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C FLIGHT: 3/1R MDAC ID: 2277 ABORT: 3/3

ITEM: O2 HEATER A&B CONTROL CIRCUITS FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

# BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- 3) PNL R1A2/H2/O2 CONT BOX
- 4) CIRCUIT, HEATER CONTROL
- 5)
- 6) 7)
- 8)
- 9) 05-6MB

#### CRITICALITIES

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HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/1R	AOA:	3/3
3/1R	ATO:	3/3
3/3		•
	3/3 3/3 3/1R 3/1R	3/3 RTLS: 3/3 TAL: 3/1R AOA: 3/1R ATO:

REDUNDANCY SCREENS: A [ 1 ] B [ P ] C [ P ]

LOCATION: SH

SHEETS 9,11,13,15

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

#### EFFECTS/RATIONALE:

LOSS OF ABILITY TO CONTROL HTRS IN 02 TANKS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INSUFFICIENT HEATING OF 02 TANK AND EVENTUAL LOSS OF REACTANTS. REDUNDANCY IN SECONDARY HTRS.

11/28/86 DATE:

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: EPD&C

FLIGHT: 3/1R

MDAC ID: 2278

ABORT:

3/1R

ITEM:

O2 HEATER A&B CONTROL CIRCUITS

FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL

SHORT, FAILS CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

#### BREAKDOWN HIERARCHY:

- 1) EPG
- 2) PRSDS
- PNL R1A2/H2/O2 CONT BOX
- CIRCUIT, HEATER CONTROL

6)

7)

8)

9) 05-6MB

	CRITICA	TTITES :	
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R

ADTMIANT INTEG .-

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ]

LOCATION: SHEETS 9,11,13,15

PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK,

THERMAL STRESS

EFFECTS/RATIONALE:

NORMAL OPERATING MODE IS "AUTO". CREW MAY SELECT MANUAL CONTROL OF HEATERS AFTER FIRST FAILURE. HEATERS ARE INHIBITED FROM OVERHEATING AND PROTECTED BY OVERPRESSURIZATION BY RELIEF VALVE. POSSIBLE LOSS OF 02 TANK, FCP AND CREW/VEHICLE.

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# APPENDIX D POTENTIAL CRITICAL ITEMS

MDAC ID	ITEM	FAILURE MODE
2003	FCP START/STOP RESISTOR	ELEMENT OPENS, HI-RESIST
2009 2011	FC CONTROLLER SWITCH FC RESISTOR	FAIL TO TRANSFER ELEMENT OPENS, HI-RESIST
2055	FC GPC PURGE SWITCH ISOLATION RESISTOR	ELEMENT OPENS, HI-RESIST
2059	FC PURGE HTR SWITCH ISOLATION RESISTOR	ELEMENT OPENS HI-RESIST
2075	GPC PURGE STATUS DIODE	OPEN
	GPC PURGE STATUS DIODE	OPEN
2084	FC 1 PUMP MOTOR CIRCUIT	
2004	BREAKER	OPEN
2095	FC 2 PUMP MOTOR CIRCUIT	OI EII
2095		ODEN
	BREAKER	OPEN
2104	FC 3 PUMP MOTOR CIRCUIT	
	BREAKER	OPEN
2113	GPC AUTO PURGE FUSE	OPENS, INADVERTENTLY
		OPENS
2114	GPC AUTO PURGE FUSE	OPENS, INADVERTENTLY
		OPENS
2116	FPC PURGE VALVE	OPEN
	ISOLATION DIODES	
2118	FC CONTROL PWR CKT FUSE	OPEN, INADVERTENTLY OPENS
2121	FC COOLANT PUMP/H2 PUMP	
	HDC .	LOSS OF OUTPUT
2123	FC COOLANT PUMP/H2 PUMP	
	DIODE	OPEN
2139	FC1 H2O LINE HTR FUSE	OPEN, INADVERTENTLY
		OPENS
2140	FC1 H20 LINE HTR HDC	LOSS OF OUTPUT, FAIL
		TO CONDUCT
2146	FC2 H2O LINE HTR FUSE	OPEN, INADVERTENTLY
2140	rez nzo bind nik rood	OPENS
2147	FC2 H2O LINE HTR HDC	LOSS OF OUTOUT, FAIL
214/	FCZ HZO LINE HIR HDC	TO CONDUCT
0150	mas troo table time buce	OPEN THA DUEDNESSELV
2153	FC3 H2O LINE HTR FUSE	OPEN, INADVERIENTLI
		OPENS
2154		LOSS OF OUTPUT, FAIL
		TO CONDUCT
2157	FC H2O RELIEF HTR FUSE	OPEN, INADVERTENTLY
		OPENS
2158	FC H20 RELIEF HTR SWITCH	FAILS TO TRANSFER
2173	H2O RELIEF VLV 1 HTR FUSE	OPEN, INADVERTENTLY
		OPENS
2174	H20 RELIEF VLV 1 HTR HDC	

MDAC ID	<u>ITEM</u>	FAILURE MODE
2179	H2O RELIEF VLV 2 HTR FUSE	OPEN, INADVERTENTLY OPENS
2180	H2O RELIEF VLV 2 HTR HDC	
2185	H2O RELIEF VLV 3 HTR FUSE	
2186		TO CONDUCT
2191		TO CONDUCT
2197		TO CONDUCT
2198		TO CONDUCT
2199		FAILS ON
2205	FC PRODUCT H2O DUMP	
	NOZZLE LOGIC TEMP CNTLR	LOSS OF OUTPUT
2206	FC PRODUCT H2O DUMP	
	NOZZLE LOGIC TEMP CNTLR	INADVERTENT OUTPUT
2221	FC 1,2,3 REACTANT SWITCH	
2222	FC 1,2,3 REACTANT SWITCH	SHORTS INADVERTENTLY
4444	rc 1,2,5 REACTANT SWITCH	CLOSES
0004	TO DOTA TWO COME CUITMON	-
2224	H2 PRIM HTR CNTL SWITCH	CLOSES
2225	H2 STDBY HTR CNTL SWITCH	FAILS TO TRANSFER
2226	H2 STDBY HTR CNTL SWITCH	SHORTS, INADVERTENTLY
2220	inz bibbi inik civib bwitch	CLOSES
2228	O2 TK TEST/RESET CNTL	
2220	SWITCH	CLOSES TRADVERTERIES
0000		
2230	O2 PRIM HTR CNTL SWITCH	SHORTS, INADVERTENTLY CLOSES
2231	O2 STDBY HTR CNTL SWITCH	
2232	O2 STDBY HTR CNTL SWITCH O2 STDBY HTR CNTL SWITCH	SHORTS INADVERTENTLY
2232		CLOSES
2233	REACT SPPLY VLV RESISTOR	
2239	FC 1,2,3 OPEN HDC	LOSS OF OUTPUT, FAIL
		TO CONDUCT
2240	REACT SPPLY VLV HDC	INADVERTENT OUTPUT
2241	FC 1,2,3 CLOSE HDC	LOSS OF OUTPUT, FAIL
		TO CONDUCT
2242	FC 1,2,3 CLOSE HDC	INADVERTENT OUTPUT
2243	FC REACT VLV CLOSE DIODE	
	O2 HTR A & B CNTL HDC	
2248		
2253	O2 MANIFOLD 1 ISOL VALVE CONTROL CIRCUIT	PWR
2259	O2 PRIM ECLSS VALVE 1	OPEN CIRCUIT, LOSS OF
	SUPPLY CONTROL CIRCUIT	
2261	H2 MANIFOLD 2 ISOL VALVE	
2272	CONTROL CIRCUIT	PWR
	CONTINUE CINCUIT	1141

MDAC ID	ITEM	FAILURE MODE
2263	H2 MANIFOLD 1 ISOL VALVE CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR
2265	O2 MANIFOLD 2 ISOL VALVE CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR
2273	O2 SECONDARY ECLSS VLV 2	OPEN CIRCUIT, LOSS OF PWR
2275 2277	H2 HTR CNTL CIRCUIT 02 HTR CNTL CIRCUIT	OPEN, LOSS OF POWER OPEN, LOSS OF POWER

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